THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVIII. No. 706.] LONDON, NOVEMBER 21, 1876. [28TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal; 28-candle gas; coke 66·70 per cent.; volatile matters 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne.

Address G. H. RAMSAY, NEWCASTLE-ON-TYNE, London, at the Lombard Exchange, 39, LOMBARD ST., E.C.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).

These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.

STEVENS & CO.,
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WORKS: BRIXHAM, TORBAY.

THOMAS PROUD,
MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS & PURIFIERS.

Scrubbers fitted with Mr. Livesey's Boards are found to be highly effective in diminishing cost of purifying.

BROOKFIELD IRON-WORKS,
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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE.

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

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THE WEDNESBURY TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.

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35, 36, 37, & 39, GRANBY ROW, MANCHESTER.

J.R.&Co.,Ld., are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.

J. R. & Co., Ld., make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

Lists may be obtained on application to
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FIRST-CLASS MATERIALS & WORKMANSHIP;
ALSO, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.

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TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.

SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
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ESTIMATES FREE
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RETORT-SETTING A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS guaranteed to carbonize a large amount of coal with a small per cent. of fuel.

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FOR THE ENGLISH GOVERNMENT
AND FOR THE GOVERNMENT OF THE NETHERLANDS
AND OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government,
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Warranted to Measure correctly & not to vary.

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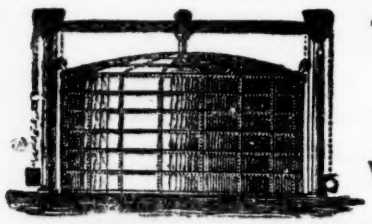
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS



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AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

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WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

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WINDSOR IRON-WORKS, LIVERPOOL.

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Manufacturer of SELF-SUPPORTING GALVANIZED CORRUGATED, CURVED, and every kind of IRON ROOFING, CHURCHES, SCHOOLS, SHEDS, and IRON BUILDINGS.

WROUGHT and CAST IRON GIRDERS, BRIDGES, TANKS, &c., and all kinds of WIRE WORK, FENCING, GATES, HURDLES, &c., for Home or Abroad.

DIXON'S CELEBRATED SELF-SUPPORTING IRON ROOFS are specially suitable for Forges, Rolling-Mills, Iron-Works, Shipbuilding Yards, Mines, Collieries, Gas and Water Works, and for general purposes.

For Roofs with Timber Framing, DIXON'S GALVANIZED OR TARRED IRON SLATES form a durable and cheap covering, costing only about the same, when fixed, as felt and boards.

DRAWINGS, ESTIMATES, AND ILLUSTRATED CATALOGUES MAY BE OBTAINED ON APPLICATION.

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GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

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Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

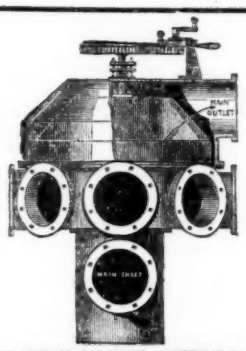
CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

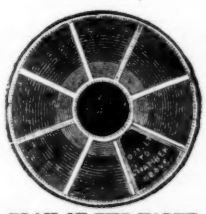
JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

C. & W. WALKERS'

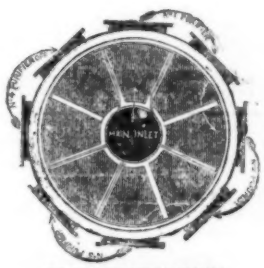
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

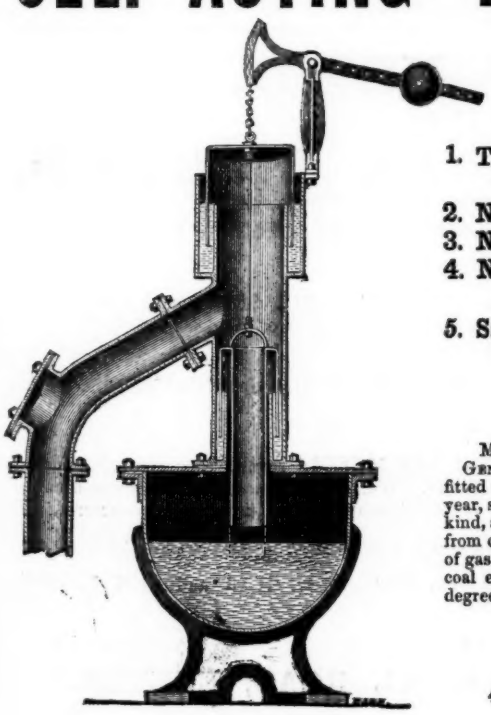
These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Tenby Gas-Works, March 29, 1876.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—In reply to your inquiry, I have to say that all the retorts at these works are fitted with your Self-Acting Patent Dip-Pipes. They have been in use now for more than a year, some for more than two years. They have never required repair or attention of any kind, and work admirably. By the use of these removable dips the retorts are kept quite free from carbon, the charges burn off more quickly than before they were adopted, and the yield of gas is increased. We get regularly a weekly and monthly average yield of gas per ton of coal exceeding 10,400 feet of 14-candle gas, and I attribute this excellent result in no small degree to the use of these Self-Acting Removable Dip-Pipes.

I am, gentlemen, yours faithfully,

(Signed) EDMUND H. STEVENSON.

For terms of use and cost, apply to Mr. G. W. STEVENSON,

4, WESTMINSTER CHAMBERS, VICTORIA STREET, S.W.

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

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GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

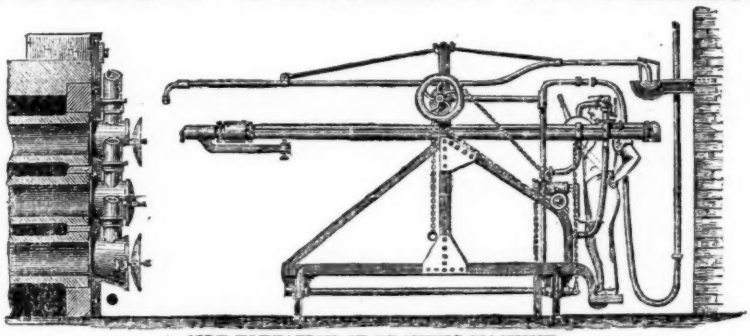
IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

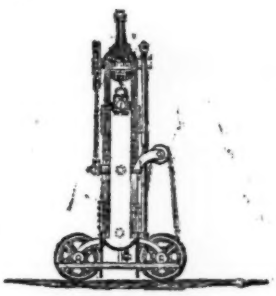
And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF DRAWING MACHINE.



END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: **TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz;**
Or all particulars may be had from **JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.**

THOMAS ALLAN & SONS,

IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

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Manufacturers of

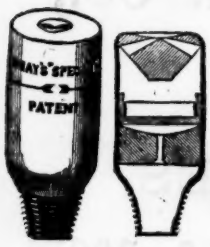
CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.
„ 1½ to 7 „ STOCKTON.

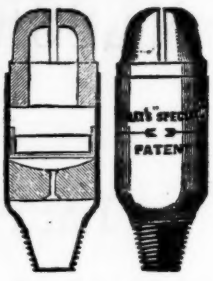
A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

London Agent: Mr. A. C. FRASER, ST. STEPHEN'S CHAMBERS, TELEGRAPH STREET.



BRAY'S
NEW
GAS-BURNERS.



BRAY'S "SPECIAL"
TRADE MARK.
PATENT.

A NEW FEATURE IN GAS LIGHTING.

OUR WELL-KNOWN

PATENT "ENAMEL" REGULATOR GAS-BURNERS

(UNION JETS AND BAT'S-WINGS)

Were designed as improvements on the common Burners, and that object has been so successfully attained that they have, we believe, met with more approval and recommendation from the Gas Engineering Profession and the Public than have been accorded to any other firm's make of Burners since the commencement of gas lighting.

Of the two kinds of Burners—the Union Jet and Bat's-wing—in general use, the latter is the least useful, because of its want of adaptability to general circumstances, and great liability to get out of order; but, when in good order, it has hitherto had the advantage of yielding more light with common and medium qualities of gas than the Union Jet. The Union Jet, on the other hand, has the advantage of greater adaptability, being useful everywhere, is less liable to get out of order, requires scarcely any attention, and will stand more rough usage. Notwithstanding these great practical advantages, which are almost everything in a Gas-Burner, Gas-Burner improvers have been attracted to the Bat's-wing, because of its giving a more showy result when tested for illuminating power only.

We have succeeded in improving both Bat's-wing and Union Jet Burners; but, while adding materially to the efficiency of the first-named, it is specially noteworthy that the Union Jet has received most advancement by these improvements. While retaining all the advantages of the Union Jet, we have brought it up in ILLUMINATING POWER to the level of the most expensive Bat's-wings specially got up for developing that feature. The result is such that we have no hesitation in pronouncing BRAY'S "SPECIAL" UNION JET

THE BEST BURNER HITHERTO PRODUCED,

AND

A NEW FEATURE IN GAS LIGHTING.

The leading features of this NEW UNION JET may be summarized as follows:—

It gives more light, from the smallest to the largest sizes, than any Union Jet was ever before known to give.

It gives 30 to 60 per cent. more light than the common Union Jets, and 15 to 20 per cent. more than our own much commended Patent "Enamel" Union Jet.

It gives as much light as the most expensive Bat's-wings specially constructed for high illuminating power, without the Bat's-wing's disadvantages.

Tested on the Photometer at various consumptions—say, 3, 4, and 5 feet of Gas per Hour, or any similar variation—and the results averaged, our New Burner will show a higher illuminating power than the best Argand. If the tests are made downwards and upwards as well as laterally, the results will be still more in favour of our New Burner.

ADDITIONAL ADVANTAGES possessed by our NEW BURNER over all others in the market, and these are applicable and are added to our IMPROVED BAT'S-WING:—

In all Burners having an arrangement for diminishing the flow of Gas before it arrives at the point of ignition, that part of the Burner which effects this object has been a source of weakness, because of its being placed in a position very liable to fracture, and easily tampered with. Indeed, this is so arranged that any one can get at and break or widen out the inlet for the Gas at pleasure, and make what ought to be an economical Burner a most extravagant one. In our New Burner, this part is so hard that it cannot be enlarged by drilling, and is so arranged that it cannot be otherwise tampered with without breaking up the whole Burner; this forming, we believe, the most efficient safeguard yet introduced against the extravagant use of Gas by those who have not to pay for it.

The Gas Supply being given through one ROUND hole, which is made through non-corrosive material, it is not so liable to stop up or get out of order as in cases where a number of small holes or narrow slits are used. When these holes are made through *metal*, the lasting property of the Burner so constructed is almost *nil*, even if the aperture is not tampered with.

There is no hissing noise caused by the passage of Gas through the diminishing arrangement of this Burner.

☞ All our "Special" Burners have our Trade Mark stamped on the sockets thus BRAY'S "SPECIAL" PATENT.

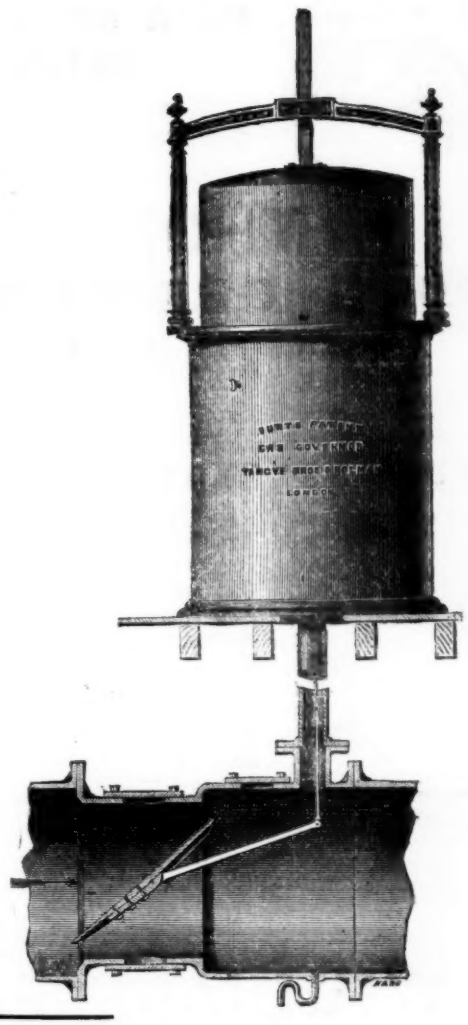
GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Co.—two 36 in. at Blackfriars.
" " a 36 in. at Goswell Road.
" " a 24 in. at "
" " a 24 in. at Whitechapel.
" " an 18 in. at Bow Common.
" " a 24 in. at Beckton.
" " a 6 in. at "
The London Gas Co.—a 24 in. at Nine Elms.
" " an 18 in. at "
" " an 8 in. at "

The Exeter Gas-Works—a 24 in.
" Abergavenny Gas-Works—a 10 in.
" Birmingham Gaslight Co.—an 8 in.
" Monmouth Gas-Works—an 8 in.
" Devonport Gas-Works—an 8 in.
" Cannes Gas-Works—an 8 in.
" Mentone Gas-Works—an 8 in.
" Rochdale Gas-Works—a 4 in.
" Imperial Gas Co., a 12 in at Great Cambridge Street.

TESTIMONIAL.

The Gaslight and Coke Company, 9, Water Street, New Bridge Street, Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

VIENNA EXHIBITION, 1873.—The highest prize and only Medal "for Progress" for Direct-Acting Steam Pumps for general purposes was awarded to TANGYE BROTHERS AND HOLMAN, Engineers, London, for

THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

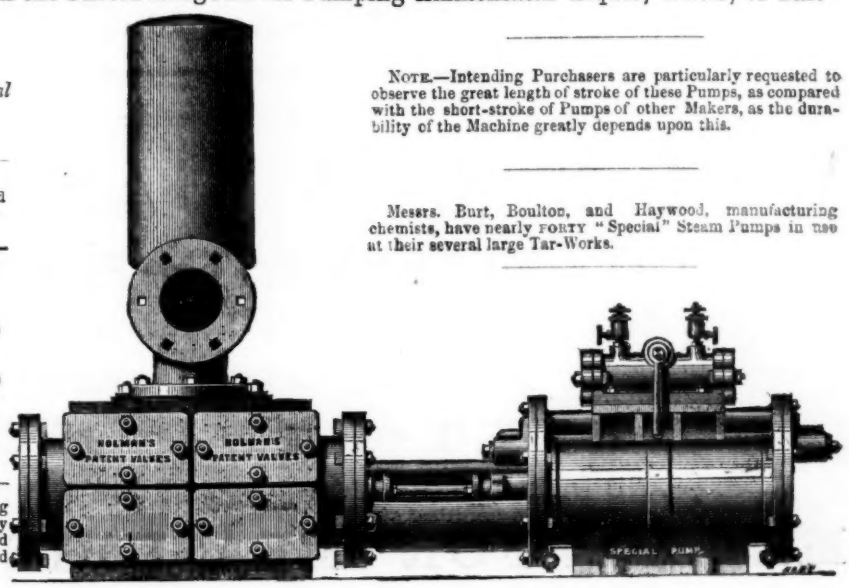
Upwards of 12,000 have been sold in England and America.

In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

The following are a few of the leading Sizes in use in Gas-Works and Chemical Works:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4*	2	9	815	18
3	3	9	1,830	18
5	2½	12	1,250	21
5*	3	12	1,830	22 10
4	4	12	3,250	25
6*	4	12	3,250	30
5	5	12	5,070	32 10
7*	5	12	5,070	40
6	6	12	7,330	40
8*	6	12	7,330	50
7	7	12	9,750	50
10*	7	12	9,750	65

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



NOTE.—Intending Purchasers are particularly requested to observe the great length of stroke of these Pumps, as compared with the short-stroke of Pumps of other Makers, as the durability of the Machine greatly depends upon this.

Messrs. Burt, Boulton, and Haywood, manufacturing chemists, have nearly FORTY "Special" Steam Pumps in use at their several large Tar-Works.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

A. MILNE, Carnforth.—*Too late for insertion this week.*

E. S. CATHELS, Montreal.—*Your note received. Thanks for suggestions.*

A DISINTERESTED OBSERVER.—*Your letter is a reply to statements made by a speaker whose name is before our readers, and we shall be willing to insert it if you allow your own name to be appended as the writer.*

A WORKING GAS-FITTER *writes to us complaining that advertisers for experienced workmen frequently require testimonials (not copies) to be sent to them, and when the application is complied with, the* original *testimonials are retained for an unreasonable time. "In one case lately" (he says) "a man was wanted* immediately, *and yet the selection is not to be made before the end of November. Employers are careless of giving more than one testimonial, and many will not give that, or even reply to a reference. I, with many more, think workmen should be treated with consideration, and employers ought to return* original *testimonials with much less delay than at present, and give the workman an opportunity of applying elsewhere." We certainly think our correspondent has a real grievance, and that advertisers should be satisfied,* in the first instance, *with copies of testimonials. Frequent complaints of the kind have been made to us, and we have had to write to advertisers requesting them to return certificates.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 21, 1876.

Circular to Gas Companies.

WE are glad to learn, on authority which we dare say is reliable, that the Metropolis Gas Companies are to have peace for a year—that is to say, no antagonistic legislative action will be taken by the Metropolitan Board in the course of next session. This is satisfactory intelligence, both for the gas companies and ratepayers, who suffer equally, we were going to say, but that would not be true, for, practically, ratepayers alone suffer. For one year, at all events, parliamentary charges will disappear from the accounts of the companies, and so far as regards gas, the parliamentary expenses of the Board will be *nil*. We shall not stop to inquire into the reasons of the Board for this abstention from further agitation. The fact is sufficient for us. If it should signify the inauguration of a new policy, by which the companies would be left tranquilly to work out their destinies, we shall hail it with great satisfaction. There is, at the present moment, no ground for contention between the authorities and the companies. The latter, it is now generally confessed, are fulfilling their duties in a very exemplary manner. We say this, knowing well the weak places; but these are small and insignificant. For our own part, we are willing to bury the hatchet; nothing, indeed, would delight us more than to have done for ever with what we must call gas politics. Great changes are impending, or seem to be impending—for there is no knowing how soon a reaction may set in—which threaten to transfer all gas undertakings to local authorities. Regarding the change as involving nothing less than a public calamity, we may still acquiesce, and cheerfully look forward to the time when our columns will be solely devoted to the spread of information.

The small measure to be promoted by the Corporation of the City of London, with reference to gas affairs, does not concern any company. It is simply to transfer the cost of the Gas Examiners from the Corporation to the Commissioners of Sewers—that is, the ratepayers.

Complaints of a nuisance from the gas-works at Fulham have been more or less prevalent for many years; in fact, we can hardly remember when there were not complaints. They have broken out afresh since Shoreditch and Hackney complained of the Haggerston works, and the same cause of nuisance is alleged—viz., "the noxious effluvia given off by the lime used to remove sulphur from the gas." The same remedy, too, was suggested—an application to the Referees not to insist on lime purification. The Chelsea and Kensington Vestries are the complainants, and the latter have ordered the extensive circulation, among various authorities, of a report on the matter, made by their medical officer, the effect of which we shall learn by-and-by. The change in public opinion on the Sulphur Question is very remarkable. We make no comment upon the matter, being perfectly content that lime purification should be abolished, for it is (not necessarily, we think) very expensive to the companies.

The Corporation of Dublin and the Alliance Gas Company having arranged their dispute, exactly as we counselled, we have the right to say that they have come to a satisfactory settlement. The Company have consented to reduce the price of gas within the city on Jan. 1st next to 4s. 6d. per 1000 feet—that is, a reduction of 3d. per 1000 feet. On the other hand, the Corporation have agreed to pay 4s. 6d. per 1000 for the gas supplied to the public lamps, together with a charge of 4s. 6d. per lamp per annum for lighting, cleansing, &c. This latter is an altogether inadequate charge, especially when we remember that the company waive all claim for interest on the £60,000 they have expended on pillars, lamps, meters, &c., in connexion with the public lights. We are glad to think that the liberality of the Company—for the concessions are all on their side—is duly appreciated by the Corporation. If the Company had insisted on the terms for public lighting they originally asked, and had gone to arbitration, we feel satisfied they would have obtained their full demands, including the interest on plant. As matters are arranged, however, we believe that the Company will derive substantial benefit.

It must be mentioned, that the price now agreed upon is subject to revision, if ever the cost of the production of gas be increased or reduced ten per cent.—above or below present rates, we presume. The Company's Act of 1874 had a one-sided provision, by virtue of which the price of gas could be increased to the advantage of the Company; but no arrangement was provided by which the consumer could obtain a reduction. The agreement as to a revision, now entered into, is just to consumer and company alike, and if, in the end, it be found practically inoperative, it will not be the fault of those who concluded it.

We see that the Company are congratulated on having, by their concessions, escaped the perils of Parliament. We take the real truth to be, that the Citizens Committee left the Corporation in the lurch, and that the guarantee-fund of £2000 was not forthcoming. We are, however, ourselves disposed to congratulate the Company, not so much on having escaped a parliamentary contest, as on having adopted a course of conciliation which will lead, we believe, to the best results. We say once more, that the object of the Directors of the Alliance Company should be to promote consumption. When Mr. Cotton looks with envy on the amount of gas consumed in Tottenham Court Road and Camden Town, he should remember that the price of gas in those localities is 1s. per 1000 less than in Dublin. In the city itself, perhaps, little can now be done towards extension; but the townships and environs still offer a wide field for exploitation.

A month ago, we expressed an opinion that the shrewd men of business of Dublin would not be induced to support any scheme for a competing gas company. We may repeat the opinion to-day, for we cannot regard the promoters of the "North Ward "Dublin Gas Company" as shrewd men of business. The idea that the sanction of Parliament could ever be obtained for a scheme to supply but a small section of the municipal area, in competition with the Alliance Company, would never enter the heads of men who know aught of the practice of Parliament in

relation to such matters. There is not, within our recollection, any instance in which Parliament have sanctioned a similar scheme. The probabilities are, we think, that nothing will be heard of the Bill, of which we see notice given, beyond its deposition, and perhaps not so much as that; for, now that the Corporation of Dublin have come to an agreement with the Alliance Company, the chance of success, which would in any case have been doubtful, is altogether removed. The further prosecution of the Bill would only involve a waste of money.

We publish, in another column, the report of the Gas and Water Companies Association, which merits the attentive perusal of our readers. The Borough Funds Bill will, of course, be re-introduced next session, and will necessitate the active opposition of the Association. The Burghs (Scotland) Gas Supply Act concerns us only so far as it goes to establish a principle, which it may be sought to extend to this country. As a fact, however, this principle is not very different from that laid down in the Public Health Act, 1875. Both Acts, while protecting statutory companies, open the way for attacks upon non-statutory undertakings. The Burghs Act, indeed, provides for the direct confiscation of these latter; for a gas company could hardly compete successfully with a public undertaking managed upon the Scottish principle, which is affirmed by this Act. It is said in the report that a local authority, having adopted the Act, and erected works, could be empowered to put a stop to the operations of any company. We think it is open to question, whether they could do more than stop extensions of operations; but the matter would not be worth disputing. Some very unfair dealing on the part of the promoters of the Act is revealed in this report. As it did not succeed, however, it need not be further alluded to than to point out that the utmost caution and vigilance must be exercised in watching parliamentary proceedings against Gas Companies.

The operation of the Public Health Act, 1875, so far as Gas Companies are concerned, has been carefully watched by the Association, and the contest between the Poole Corporation and the Gas Company of that town is very properly referred to at some length. That there should be two public bodies empowered to grant Provisional Orders for like undertakings is, in itself, objectionable. A certain conflict is inevitable. The Poole Corporation went to the Local Government Board for an Order, under the Public Health Act; the Company went to the Board of Trade, under the Gas and Water Works Facilities Act. What would have happened if both Orders had been granted, as they might have been? An expensive Parliamentary Contest. The moral of the Poole case, as we said at the time, is, that no Company, in the face of a Corporation, or even a Local Board, should be, in these critical days, without statutory powers. Rights, we know, involve obligations. A Special Act or Provisional Order conferring the one, necessarily imposes the other. The balance of advantages, however, obviously lies with the possession of statutory powers.

The commentary of the able Secretary of the Association, on recent Metropolitan Gas Legislation is so full and complete, that we have nothing to add. It is properly pointed out, that the efforts of the authorities, sincere or otherwise, to obtain uniform regulations for all the Metropolitan Companies, have ended in making "the obligations and liabilities of the respective com-"panies wider apart than ever." The variations are clearly pointed out in the report, and to that document we have pleasure in referring our readers.

We have so often condemned what we have called the waste of cannel in Scotland, in the production of gas of unreasonably high illuminating power, that we are glad to see a proposal made to reduce the standard of illuminating power to twenty candles all over Scotland. The arguments, *pro* and *con*, will be found in the address of Mr. Monk, which we print in another column. The objections we entertain to the supply of rich gas will be found in the extracts from our "Circular" columns made by Mr. Monk. The arguments against a change are, also, fairly set forth by the author of the address. It may, we think, be taken as a fact, *teste* Mr. M'Crae and other gas managers, that the rich gas of Scotland is never burned to full advantage by ordinary consumers. The waste in Dundee is, according to Mr. M'Crae, enormous. The Corporation of Glasgow, whose standard is twenty-five candles, have been charged with supplying "dirty "smoke," the origin of the accusation being sufficiently apparent. We have often heard a similar charge brought against the old Western Company, who seldom supplied gas of more than twenty-two candle power. We shall watch the movement started in Scotland with some curiosity. On the one hand, it promises, if successful, to open a better market for the splint coals of that country, and, on the other, it may leave a larger supply of cannel for this country.

The Burghs (Scotland) Gas Supply Act fixes the illuminating power of gas, supplied by undertakings started under its authority, at not less than fourteen candles. This standard we regard as too low for Scotland, because Scotch splint coal—the cheapest material for gas-making purposes in that country—yields, as we are informed, from twenty to twenty-two candle gas. Nevertheless, if the lower standard required by the Act could be made general, a desirable end would be gained. It would be a great blessing if the fourteen-candle standard, which we may now regard as the national standard for England, obtained from Land's End to John o'Groats.

Water and Sanitary Notes.

We have, to-day, but a brief space in which to refer to matters which deserve longer and more serious notice; but we cannot pass without remark a meeting of "delegates" from Vestries and District Boards, who congregated to protest against the Metropolitan Water Companies availing themselves of their legal rights, by increasing their water-rates according to the new assessments. We believe we are fully justified in stating that not one of the companies have as yet availed themselves of the full powers they have possessed in past times, and that not one have the smallest intention (except under very special circumstances) of advancing their rates in accordance with the recent assessments.

An interesting gathering took place at the Birmingham Sewage Works the other day, when the Duke of Sutherland, as Chairman of Scott's Sewage Company, Limited, got together some members of the Corporation of Birmingham, with a few sympathizing friends and some interested co-directors, including H. Cole, C.B., to witness the innocent operation of obtaining ammonia by the distillation of human excreta with lime, and the manufacture of a valuable manure, by the addition of a phosphatizing material to the dry residue. Now, if a profit is to be made by these operations, it is perfectly open to the Corporation of Birmingham to realize it. There is no law extant which can prevent them from making ammonia from fæces and urine, and converting it into sulphate; nor can they be prevented from mixing phosphatizing ingredients with dry excreta. If any profit is to be made by these operations, the Corporation of Birmingham should make it; and we look to Mr. Alderman Avery to see that the South Kensington Swells are not subsidized at the expense of the ratepayers of Birmingham.

GAS LEGISLATION IN 1876.

The legislation of the past session, with regard to gas, offers nothing calling for particular remark. There is, of necessity, a sameness in the general provisions of the several Acts, the differences being mainly in the amounts of capital authorized, the maximum charge allowed for gas, and the minimum of illuminating power prescribed. To a notice of these particulars we, therefore, confine our summary, unless some novel and special enactment occurs in the Acts.

In the last session nine gas companies without statutory powers obtained Acts of Incorporation, with the rights and privileges usually conferred. The following are the Acts passed:—

The *Blackrod Gas Act*, which dissolves the Blackrod Gas Company, Limited, and re-incorporates the proprietors. The company obtain power to raise additional capital to the amount of £10,000, which is only to be entitled to a seven per cent. dividend. They are required to supply fourteen-candle gas, tested by Sugg's "London" Argand, No. 1, at a price not exceeding 5s. 6d. per 1000 feet. The limits of the company are within a mining district, and a special clause ensures the non-liability of the Wigan Coal and Iron Company for damages, in case of fractured pipes and escapes of gas.

The *Gorleston and Southtown Gas Act* dissolves and re-incorporates the Gorleston and Southtown Gaslight and Coke Company. It authorizes the company to raise £10,000 additional capital entitled to only seven per cent., and requires them to supply fourteen-candle gas at a maximum price of 6s. per 1000 feet. The urban sanitary authority may require the company to place and maintain public lamps, nineteen shillings per annum being allowed for lighting, extinguishing, &c., the gas to be charged at the lowest rate at which it is supplied to private consumers, unless otherwise agreed upon.

The *Kildwick Parish Gas Act* incorporates a new company with power to supply various townships in the parish of Kildwick, in the West Riding of York. The company are empowered to raise capital to the amount of £30,000, and to borrow to the usual extent of one-fourth of the capital. Gas of fourteen-candle power, tested by Sugg's "London" Argand, No. 1, is to be supplied at a price not exceeding 6s. per 1000 feet. The special provisions of the Act are of purely local interest, and need not be noticed.

The *Maidenhead Gas Act* incorporates the Maidenhead Gas Company with power to raise £20,000 additional capital, the dividend on which is limited to seven per cent. The Act capi-

talizes some expended profits, and, as original capital, leaves it entitled to ten per cent. Fourteen-candle gas is to be supplied at a maximum rate varying from 5s. 6d. to 6s., according to the distance from the works.

The *Redcar and Coatham Gas Act* dissolves and re-incorporates the Redcar Gas Company with power to raise £16,000 additional capital, the dividend on which is limited to seven per cent. Fourteen-candle gas is to be supplied at a price not exceeding 6s. per 1000 feet.

The *Sevenoaks Gas Act* dissolves and re-incorporates the Sevenoaks Gas Company with power to raise additional capital to the amount of £25,000, the dividends on which are limited as usual. The gas supplied is to have the illuminating power of fourteen candles, and the price is to be regulated according to the cost of coals at the works. The maximum price allowed is 6s. per 1000 feet; but if the average cost of coal in any quarter does not exceed 25s. per ton, only 5s. 6d. can be charged, and if the coal cost more than 25s., but not more than 30s., the price of gas is not to exceed 5s. 9d. per 1000 feet during the quarter.

The *Slaithwaite Gas Act* dissolves and re-incorporates the Slaithwaite Gas Company. The additional capital sanctioned is £10,000, the dividend on which is limited as usual. Fourteen-candle gas is to be supplied at a price not to exceed 5s. 6d. per 1000 feet.

The *Spennymoor and Tudhoe Gas Act* incorporates the Spennymoor and Tudhoe Gas Company, and authorizes them to raise additional capital to the amount of £37,500, the dividend on which is limited to six per cent. or seven per cent., according as preference or ordinary shares are issued. Fourteen-candle gas is to be supplied at the maximum rate of 5s. per 1000 feet.

The *Sutton Gas Act* dissolves and re-incorporates the Sutton Gaslight and Coke Company, granting, at the same time, authority to raise additional capital to the amount of £35,000, the dividends on which are limited as usual; gas of fourteen-candle power is to be supplied, at rates not exceeding 5s. 10d. and 6s. 4d., according to locality; but it is provided that the accounts of all consumers in the parishes of Sutton and Cheam shall be subject to a rebate of sixpence per 1000 feet, if paid within a calendar month from quarter-day.

Acts of Incorporation vary but little in their general terms and provisions. They all make the necessary arrangements for the winding-up of the dissolved company, and the constitution of the new. The Gas-Works Clauses Act, 1871, being in all cases incorporated with the special Acts, the provisions, so far as regards the relations of the company with the consumer, are necessarily very much alike. In the above Acts, it will be seen that the main difference lies in the maximum prices allowed. The quality of gas prescribed, it will be remarked, is, whether the undertaking be situated in the centre of the Durham coal-field, as Spennymoor; in the North Riding of Yorkshire, as Redcar; or in the counties of Norfolk, Surrey, and Kent, invariably the same—fourteen candles. Nor does the maximum price vary much. It is 6s. at Redcar, and the same at Gorleston, in Norfolk, and Sevenoaks, in Kent. The cost of coal in these districts may be supposed to vary considerably; but no doubt the promoters, in each case, had well considered the question of price.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXVIII.

Distribution.

It is frequently observed, in the course of the taking up of mains for replacement by others of larger size, that the ground is blackened for yards by the filtration of gas through the soil in which the pipes have been embedded. This is not in any appreciable measure due, as has been supposed, to a transpiration of the gas through the solid metal of the pipes—*exosmose*, as it has been called. We may at once dismiss this view, according to which the gas is supposed to permeate the iron, as altogether untenable, quite contrary to experience and fact. The effects noticed are to be attributed to leakage, pure and simple, either through defects in the metal, or to defective joints in the mains or service-pipes, or both.

Were the result due to the phenomenon of *exosmose*, as has been asserted, the effects would be constant and universal; whereas we know that, so far from this being the case, such appearances in the ground, in the neighbourhood of well-jointed gas-pipes, that have been in use for years, are altogether exceptional.

At the meeting of the British Association of Gas Managers in 1867, when the subject of unaccounted-for gas was under discussion, Mr. Hawksley, with his usual astuteness, pointed out that there was a general objection to stating the amount of leakage by a per centage. "Though good for any particular work," he said, "it was delusive when employed as a means of comparing different works one with another. He thought he gathered from one of the gentlemen present, that some time ago his leakage amounted to about 20 per cent., and that recently he had brought it down to 14 per cent. But the gentleman did not tell the meeting this, which was also the fact, that he was now passing one-half more gas through the same mains than he did formerly, and, consequently, the admeasurement, estimated as stated, by a per centage, did not necessarily represent a diminution in the actual amount of leakage, but only a diminution in proportion to the quantity of gas made. He hoped, therefore, that when, hereafter, they had statements made that the amount of leakage, put into per centage, was so much, they would also have another mode of measurement given, either per mile of main through which the gas passed, or in some other more reasonable manner. Now, there was an instance of what he meant in the town of Nottingham. The leakage was almost precisely one cubic foot per minute for every mile of main, and that was a thing which need not be reduced to any per centage whatever. If hereafter the company passed twice as much gas through their mains as they did now, they would still only expect to lose one cubic foot per minute upon each mile of main, and, therefore, their present leakage of 13 or 14 per cent. would appear to be only 6 or 7 per cent. In that event the statement would be a perfect delusion." Mr. George Anderson, also, at the meeting in 1873, condemned the practice of reckoning by per centage, and quoted instances to show its fallacy, though he did not suggest any more satisfactory mode of computation or comparison.

The force of the argument must be admitted to some extent. For example, take the production of gas and the leakage or loss throughout the United Kingdom, as it was 20 or 25 years ago, and compare them with the production and unaccounted-for gas at the present time, and we shall probably find an increase in the actual leakage over that of 25 years since, although the per centage of loss is considerably less. It may also be premised that, with the increased demand for gas, the average size of the mains is greater than formerly, and that consequently the proportion of joint area to the area of the pipes is materially reduced, so diminishing the chances of leakage in that direction. But it must be remembered that a vast extension of mains has taken place, and an enormous number of additional services and meters have been added since that period down to the present time; so that it may be fairly assumed that the reduced per centage of loss is an indication of generally improved working and management. In point of fact, too, we know that by the adoption of the proper means promptly applied, and perseveringly and energetically carried out, managers have been enabled most materially to reduce the loss account within the brief space of a few months; when, instead of an increased, there has been a diminished production, though with an augmented consumption throughout the district.

Desirable as it might be to be able to form a comparison between different works, of the loss per mile of main, we look upon it as impracticable. The comparison, to be of value, could only be made between mains equal in size; and the number of services, as well as their diameter and length, should be alike. Of course, these equal conditions are impossible of attainment.

We are aware that the same objections will apply, though in a lesser degree, to comparisons by a per centage; and there can be no doubt that injustice may easily be done, unless the whole of the circumstances of the respective works that are being compared are taken into consideration.

We repeat, what we have before expressed in other words, that it is only by intelligent and strict supervision, constantly in operation, that the unaccounted-for gas can be reduced and kept within moderate limits. On the other hand, it is satisfactory to know that the exercise of these qualities in a manager is always certain to ensure ultimate success in dealing with any difficulties in this respect.

The causes that go to produce the unaccounted-for gas are multifold, and, being less obvious to the senses than the judgment, are more likely to be overlooked or disregarded, until forced upon the attention by their disastrous effects. They are like weeds in cultivated soil, and exceedingly tenacious of life. Indeed, the gas manager, like the patient yet vigilant agriculturist, must be diligently alive to the necessity of so keeping them in check, that they shall not spring up and gather substance and strength sufficient to impoverish the goodly crop.

(To be continued.)

Public Lighting at Wolverhampton.—At the meeting of the Town Council of Wolverhampton, on the 14th inst., the question of the supply of gas to the public lamps was discussed. Alderman Jones moved—"That a contract be entered into between this council and the Wolverhampton Gas Company for a supply of gas to the public lamps, buildings, &c., of the borough, for the term of three years as from the 1st of September last, upon the same terms as those set forth in the contract dated the 29th day of September, 1873, and which expired on the 31st of August last, with the following exceptions—namely: That the maximum price to be charged shall be 2s. 9d. per 1000 feet, and the minimum price being the lowest price charged to any gas consumer during the term of the contract." In doing so, he went into particulars as to the lighting of the streets, and the relative cost of the public lamps in Wolverhampton and other adjacent towns. Taking the whole town, there were 1182 lamps in all, 814 of which were lighted during nine months of the year—from August to May—and 368 all the year round. The cost of the first class of lamps, including cleaning, was £2 10s. each per year, and the cost of the second £3. By the new contract the gas company intended to charge the corporation 2s. 9d. per 1000 feet. The Street Sub-Committee had gone into the question of cost with the manager of the gas company, and were satisfied that the charge was a fair one. Comparing Wolverhampton with other towns they found that they had an advantage in the rate at which they were supplied as contrasted with towns where the gas was not in the hands of the corporation; but where the corporation supplied their own lamps the charge was naturally rather less. At Birmingham, where the works were in the hands of the corporation, the rate was 2s. 7½d. At Walsall, where the gas was also in the hands of the corporation, the charge to small consumers was 2s. 5d. per 1000 feet, and to large consumers 2s. 1d.; but in Stafford, where there was a private gas company, the cost was 3s. 11½d.; in Worcester, 3s. 8d.; in Longton, 3s. 6d.; and in Hanley, 3s. 6d. Mr. Walsh seconded the motion, and observed that he should be very glad to see the time come when the corporation could have the gas in their own hands. Mr. Hill considered the works would not be nearly so well managed as by leasing them to a private company. The resolution was then passed.

Review.

WATER ANALYSIS.*

When a book reaches a fourth edition in the course of a very few years, the fact may be accepted as a proof that it possesses merit which is generally recognized. This is certainly the case with the work under notice. The first edition (preceded by some papers read before the Chemical Society) introduced a novel mode of determining the amount of organic mater in water. The process, though at first condemned as untrustworthy by two of our leading chemists (on insufficient grounds, it would appear), is now almost exclusively adopted for the estimation of the nitrogenous organic contamination in water. It has been fully described, together with what may be called the rival processes, in our notices of previous editions of this work, and need not be here.

In former editions, but little reference was made to the mineral ingredients in water, it being very rightly considered that the wholesomeness or unwholesomeness of a water depended more on the amount of organic matter than on the mineral matters, which are to be regarded as natural ingredients, and only in a qualified sense as impurities. It is, however, often advisable to know the nature and amount of the mineral constituents, and Mr. Wanklyn, in this edition, gives a scheme for their quantitative determination.

Among the new matter now introduced is a process devised by Professor Mohr for the volumetric determination of the carbonates in a water. It is very simple and easy of execution, and is certain to be generally adopted by analysts.

To sum up the characteristics of this volume, we may say that the work is now—what it has not been before—a *complete* guide to the analysis of water, and we may add our opinion that it is the best extant. We predict a larger success for this edition than any of its predecessors attained.

Correspondence.

TEN AND SEVEN PER CENT. DIVIDENDS.

Sir,—With reference to new capital bearing less than 10 per cent. dividend—*i. e.*, upon the question of the 7 per cent. dividend—there seems great confusion in the minds of gas proprietors. It is "prescribed" in the Act for a certain class of new capital—*i.e.*, a "maximum" rate, just the same as 10 per cent. is "prescribed" as a "maximum" under the Gas-Works Clauses Act for the older and original capital. When 7 per cent. has been made up all round for new and old capital, the surplus profits (if any) go to aggrandise the older capital up to 10 per cent., and the further surplus (if any) to the consumers, in reduction of the price of gas. Should there be a deficit on the 10 per cent. dividend, it must be reduced, or supplied out of the reserve-fund. But should there not be profits sufficient to pay 7 per cent. all round, the deficiency to make up that amount may be made up out of the reserve-fund; but while the new stock takes no more than its maximum or prescribed dividend, no heed or care is to be taken of the exact amount of the reserve required for the latter purpose. If the profits are usually and permanently much less than enough to pay 7 per cent. all round on both stocks, then the dividends are to go down, *pari passu*, to 6 per cent., 5 per cent., &c., until *nothing* is paid on either. This is well provided for in the creation of the late Imperial Company's H stock, 7 per cent., where it is stipulated, amongst other things, "that this stock shall participate with the ordinary stock, &c., *up to* seven pounds per centum per annum." There are proprietors who imagine that a less than 10 per cent. is a guaranteed or preferential dividend, and takes its diminished dividend while the ordinary stock takes *nil*, but it is not so; otherwise it would have been so provided in the special Act. Others, again, consider that if the ordinary stock goes down one per cent. below 10 per cent., the limited dividend is to go down proportionately, and so on, step by step. Others, again, suppose that if the ordinary stock dividend is reduced, it is in the power of the general meeting to reduce the limited dividend as it pleases, and the voting power of the ordinary stock being in excess of the limited stock, it will do so.

Again, the sliding scale intervenes, the price of gas goes down 4d., and the ordinary stock dividend goes up one per cent.; but the stocks with limited dividends can never receive aught in excess of their limit.

Again, if a coal famine occur, and the price of gas is raised more than a shilling, is the 7 per cent. dividend to be diminished?

Then, as to the sale of new stock by auction, is it the ordinary 10 per cent. stock that is to be sold, or some stock with more limited dividend?

Then again, what will the buyers of the former stock at 210 say if their dividend falls to only 2½ per cent. on their investment, and the price of the stock to less than 100? Some of us in the present generation are holders of London gas stock which cost us no more than £5 or £6 per £100, or Phœnix stock which cost us only £50 per £100, both of which are now fetching £210. And as they have gone up so, with a low maximum price of gas and a coal famine, even with a sliding scale they may again go down to a dividend of *nil* and similar price. If there is to be any solidity in gas property, the dividends must be rendered secure by a good reserve-fund. Again, if the stock is to be sold by public auction, a large quantity, such as a million, must never be thrown on the market at once, or assuredly it will not go off at all, or it will be "beared" down to a price more like 150 than its present price of 220. It must be dribbled upon the market in small parcels, in the same way that the ex-Railway King did with his own railway stock, when he was advising all the world to buy.

These are all questions upon which, at present, great difference of opinion exists. I believe that most of them will be settled by vote of general meetings, in different companies in modes directly opposed to each other, and, in most companies, in a manner most unjust, because the original capital, being the larger amount, will always outvote the newer and lesser-dividend capital.

It is an interesting point, and one upon which I should like to see discussion in your columns, and, if possible, it should be legally settled, while everything is floating on *couleur de rose*, and before the difficulty has absolutely occurred.

Ex-Secretary.

* "Water Analysis: A Practical Treatise on the Examination of Potable Water." By J. A. Wanklyn and E. T. Chapman. Fourth edition, rewritten by J. A. Wanklyn, M.R.C.S. London: Trübner and Co., 1876.

BACK DIVIDENDS *VERSUS* RESERVE-FUND.

Sir,—I have been looking forward with anxious expectation for some of your able correspondents to elucidate this question, especially as gas companies have been advised to form strong reserve-funds as a prior duty to the liquidation of back dividends; and, therefore, for those companies who are incorporated under the Gas-Works Clauses Act of 1847, I would ask, *can they pay any back dividends after the formation of a reserve-fund?*

Section 30 of the above Act directs the profits to be divided at the prescribed rate, and after this provision shall have been complied with, that the surplus shall be applied to make up the deficiency of any previous year's dividend. Section 31 further directs that if there is a larger sum than is sufficient *after* making up the deficiency in the dividends of any previous year, the excess beyond shall, from time to time, be invested to form a reserve-fund; and section 31 defines the use of such reserve-fund "to make up any deficiency which *may* at any time *happen*" (let it be understood *any* deficiency "which *may* happen," not "which has happened") in the amount of divisible profits." Therefore, I contend that companies under this Act (unless otherwise empowered by special Act), after having formed a reserve-fund, are precluded by "*laches*" from paying back dividends.

That the Legislature intended that the clauses and provisions of the 1847 Act were to be carried out in the order they are enacted, cannot, I think, be doubted, and may be read thus—that, firstly, the *profits should be applied* to the payment of maximum dividends; secondly, that any surplus should be applied to back dividends; and thirdly, that any further surplus should be applied to the formation of a reserve-fund; should there still remain a surplus, that a reduction in the price of gas should take place, but that the reserve-fund *may* be resorted to, should there *happen* to be any deficiency in the profits of *any* after period.

I cannot agree with your correspondent that there is a difficulty in the manipulation of back dividends, which, to my view, is very facile. Your correspondent accuses me of introducing a foreign word into this controversy. That I used the word "legality" I admit, in place of "imperative;" but, with all due deference to that gentleman, I maintain that nothing of an "imperative" nature can be done under *parliamentary* power, but that which is "legal." Referring to the letter of the 11th inst., your correspondent says, "As an abstract question, which is the form in which your correspondent has put it, the *power* to make all dividends that may at any time have fallen short of the prescribed rate up to that rate is *beyond all question or doubt*;" and, further, he asks, "Is it possible that your correspondent does not know the difference between a bond and a share, or the difference between the interest due on a loan and a back dividend? The one is an obligation—a debt that has been incurred, and must be paid or cancelled before it can be got rid of; the other is a *'myth,' and has no existence.*"

How is it your correspondent, after admitting that the *power* to pay back dividends is beyond *all question or doubt*, wishes to prove it is a *myth?* I can quite understand that your correspondent is anxious to be understood, but how is it possible? for, by his letter of the 25th ult., he states that the payment of back dividends "is scarcely ever justifiable;" and further, "that it is questionable whether it is ever good management." And, by his letter of the 11th inst., he states that power is "*beyond all question or doubt;*" and, further, that it is a "*myth, and has no existence.*" Surely this navigation wants some explanation, especially to those smaller companies whom your correspondent "has been speaking for."

Your correspondent accuses me of not quoting at length. This has been caused unintentionally, by my attempt to winnow the grain that I thought pertinent to the question.

With regard to your correspondent's "one hundred to one" remarks, I do not think it is necessary to comment.

Geo. Sandell.

4, *Skinner's Place, Size Lane, E.C., Nov.* 16, 1876.

Sir,—As a shareholder in a gas company who some years ago were paying only 8 per cent. dividend, but who could now pay more than 10 per cent., I have followed with intense interest the discussion in your Journal respecting this important subject.

Reviewing the correspondence thus far, it would appear that companies intending to pay back dividends have the following considerations submitted to them, as tending effectually to prevent their so doing—viz.: The questionable legality of the proceeding, the advisability of first forming a strong reserve-fund, and the difficulty of manipulating the distribution between old and new capital.

Personally, I regret to think that the question of the legality of paying back dividends is a highly complicated one, and that, considering the very loose construction of the Act itself, together with the decision of the Master of the Rolls in the Worcester New Gaslight Company's case, that even when viewed in the "abstract," the ground is *not* so "clear and open" as Mr. Livesey expresses it *is*, in his opinion. It is quite evident, however, from the action taken at Wakefield, as reported in your last issue, and from the continued agitation on the subject, that the judgment in the Worcester case is not satisfactory to others besides myself, and it may not be irrelevant to ask, if, as Sir G. Jessel determined, companies are "not entitled in any one year to divide more than 10 per cent. out of profits," why should the 1847 Act be burdened, in clause 30, with the words "deficiency of any *previous* dividend;" or clause 31 with "*after* making up the deficiency of *any* previous year"? These provisions are meaningless, if they are not inserted for the purpose of empowering shareholders, if they find it impossible to reap the full benefit of the maximum dividend in the early years of their working, to recoup themselves when prosperity should render it practicable, and before they could be compelled to reduce the price of their gas. I feel persuaded that, in many instances, gas shares would not have sold at the premiums reached unless there had been a very general belief that this retrospective advantage was, without doubt, legally secured to the purchasers of gas companies shares.

It is also impossible to agree with Mr. Livesey in advising the making of a reserve-fund, so that all should be "benefited alike," as preferable to paying back dividends, for this contingent-fund could never benefit anybody, except in the event of a deficiency which might never happen (unless it were the consumers, who, upon its completion, would have an immediate right to demand a reduction in the price of gas); whereas the holders of original shares, having regard to the controverted circumstances of their position, and the ambiguity of the statute, may justly

argue that they are contending for a balance of the dividend allowed them by law, and that it is imperative upon the company to settle this claim on the profits before attempting to raise the contingent-fund.

With reference to the manipulation in distributing back dividends with respect to capital, I am quite unable to perceive what difficulty could possibly arise; for if, as your correspondent states, an "increase" of capital "has received the full prescribed rate of dividend the whole time it has been in existence," most certainly the claim on this account is completely satisfied, and no charge for "making up" back dividends could be made on any fund whatever. Further, I would submit, as an explanation of the manner of distribution, a case which is not entirely a hypothetical one, and which seems to me thoroughly to confute this objection. A company obtained parliamentary powers in 1865, with fully paid-up shares, receiving power to raise additional capital, both these classes being entitled to a maximum dividend of 10 per cent., and have subsequently obtained a further grant of capital, which has all along received the maximum dividend prescribed—*i.e.*, 7½ per cent. The demand made for back dividends for these various descriptions of capital would be as hereunder shown, and surely there could be no injustice in awarding it accordingly:—

Year.	Capital entitled to a Maximum Dividend of 10 per Cent.						Capital entitled to a Max. Div. of 7½ per Cent.			
			Old Capital.		New Capital.					
	Dividend Paid per Cent.	Balance Due per Cent.	Paid Up per Share.	Back Dividend Due per Share.	Paid Up per Share.	Back Dividend Due per Share.	Dividend Paid per Cent.	Balance Due per Cent.	Paid Up per Share.	Back Dividend Due per Share.
			£	s. d.	£	s. d.			£	£
1865 . . .	6	4	10	8 0	—	—	—	—	—	—
1866 . . .	6	4	10	8 0	3	2 4·8	—	—	—	—
1868 . . .	9	1	10	2 0	4	0 9·6	—	—	—	—
1869 . . .	10	—	10	—	5	—	—	—	—	—
1873 . . .	8	2	10	4 0	8	3 2·4	—	—	—	—
1874 . . .	10	—	10	—	10	—	7½	—	3	—
1875 . . .	10	—	10	—	10	—	7½	—	6	—

My thanks and those of my *confrères* are decidedly due to you for giving publicity to this topic; also to Mr. W. Livesey and Mr. G. Sandell (who is evidently most anxious, on behalf of the interest of original shareholders), for their efforts towards the solution of the question, and it is only to be hoped the present agitation may shortly lead to some legal tribunal ruling upon the Act a dictum quite the reverse of that arrived at in the Worcester New Gaslight Company's case.

Clapton, E., Nov. 17, 1876. W. A. CHARDIN.

RECOVERY OF LIGHT OIL IN THE DISTILLATION OF SHALES.

SIR,—My attention has been drawn to a correspondence in your paper, on the "Recovery of the very Volatile Hydrocarbons diffused through the Waste Shale Gases," and as I take a little credit to myself for getting the oil companies to take action in this direction, perhaps I may be able to throw a little light on the subject in dispute.

There is some confusion in the term "very volatile," as used by your correspondents; it leaves each to form or fix his own standard for the volatility. I take it, the point in dispute is the recovery of a spirit of light gravity as a substitute for gasolene (sp. gr. 650° to 660° about); and if the *new* shale spirit be also termed gasolene, it will make matters plainer. Mr. Calderwood says: "The more volatile hydrocarbons have all along been recovered, together with the less volatile, though they have not until recently been sold separately." I do not, however, imagine that he will say this new shale spirit, gasolene, was so recovered. When I applied to Young's Paraffin Company to get them to move in this, I was told by their general manager their 720° spirit would suit my purpose. As that gravity was far too heavy for me, the matter, I understand, was remitted to their works, and reported on from there. I was then informed that the light spirit I required was not in their shale; and, further, that they, at that time, were practically recovering all the spirit it contained. Yet, strange to say, almost the very day I got that reply, a small experimental apparatus was being tested by Mr. Coleman, at their Addiewell works, and he got the very spirit I required from their products.

It is not my intention, or province, to enter here into the relative merits of Mr. Coleman's coke tower, or Mr. William Young's processes, but simply to give the facts of the case as to the recovery of the shale gasolene.

In the autum of 1874 I applied to several of the oil companies to try and induce them to make a spirit of a specific gravity of about 650° to 660°, at 60° Fahr., suitable for making air gas at low temperatures. Mr. Coleman, of Young's Paraffin Company, and Mr. William Young, of the Clippens Company, were the only parties who would entertain this; the latter gentleman (Mr. W. Young) informed me that he had been working, for years previous to my application, in same direction. He produced and submitted to me, in December, 1874, three one-gallon samples of a specific gravity of 670° to 680°; as they were rather heavy, he further fractionalized till he brought them down to 661°, and the Clippens Company have now, for the last year, been giving me large deliveries of that quality or gravity of spirit. They also gave me a sample, about 638° sp. gr., but that was simply to show that light enough spirit could be produced. As regards Young's Paraffin Company. In February, 1875, Mr. Coleman, from a small experimental apparatus, produced a small bottle of spirit of 658° sp. gr., and proved to the company the presence of a considerable body of spirit that was, at that time, waste. Delay followed delay in attempts to get the same results from their coke-tower process, before ordering a machine on Mr. Coleman's principle; and it is not many months since this machine was started at their Bathgate works. I understand as yet it is only being partially worked for the heavier spirit, and that the second condenser—the one that is to give the 658° gravity—is not yet at work. I have never seen any sample of this company's production that I consider suitable for making pneumatic (air) gas.

From the foregoing statement, your readers interested will see that, whoever may have brought out the various processes for the recovery of the *very volatile hydrocarbons*, that the Clippens Company were the first to submit a sample, and to supply it commercially.

54, St. Enoch Square, Glasgow, Nov. 9, 1876. RICHARD MILLER.

REMOVABLE DIP-PIPES.

SIR,—While in no way wishing to depreciate honest and disinterested efforts to elucidate important questions relating to the manufacture of gas, I feel bound to offer a mild protest against the pedantic utterances of some who attempt to ignore the arguments of those whose professional experience enables them to speak with undoubted authority. In an ably-written paper, printed in the Appendix to the Report of the British Association of Gas Managers, 1876 meeting, the writer states: "I am of opinion that the removal of the dip-pipe is not desirable, nor could any of the proposed means for obtaining that object be conducive to the welfare of a gas-work." The succeeding paper in the appendix, by Mr. W. L. Copp, sets forth the advantages following the use of means whereby the pressure caused by the dip-pipe may be avoided, introducing (very naturally) his patent apparatus, "by the use of which," as he mildly puts it, "the problem is solved of how to remove the *whole* of the disadvantages of the hydraulic seal, and yet preserve the dip as a perfect safety." The writer, however, omitted to point out that his anti-dip is an addition to the numerous unsafe appliances in a gas-work I have no desire to disbelieve Mr. Copp; but in the face of his statement, the author of the first quoted paper practically denies the so-called advantages arising from the use of the "anti-dip," inasmuch as "all mechanical means proposed to remove this, *must entail considerable attention at each charge, and any want of care might result in loss or accident.*" He also points to the pressure which must arise if no dip be used (unless an exhauster be employed), and demonstrates clearly that "no appreciable difference in the accumulation of carbon could arise from so slight a variation in the pressure"—viz., by the removal of the dip-pipe. The writer prepared his paper probably with the knowledge that Mr. Copp was down on the list to argue the contrary view, and was prepared for the task to which he applied himself. Speaking from a lengthy experience, both at home and abroad, I can give a confirmatory support to the objections urged by him to the means proposed for the purpose of neutralizing the action of the hydraulic seal. The sacrifice of safety, and the additional risk and trouble attending their use are alone sufficient to condemn them. Mr. Copp also states in the paper referred to, "I have had these valves in use for more than fifteen months, and my experience is, after a careful and thorough test, that the deposit of carbon is completely prevented, and I have never had occasion to scurf a retort since;" and after speaking of the increased yield produced by relieving the retorts of pressure, says, "I also find the gas possesses higher illuminating properties." Having experimented very considerably with and without the dip, I could furnish your readers with figures showing that, with an increase in yield beyond a certain point (according to the particular kind of coal carbonized), the *decrease* of the illuminating power is in exact proportion to the *increased* yield, and that the occasional tendency to vacuum, notwithstanding every care, reduced the illuminating power to an alarming extent, when the pressure was removed from the retort. How Mr. Copp could work for fifteen months without carbon accumulating in the retorts is inexplicable, for, as pointed out by the writer of the first-named paper, "The dip of the hydraulic seal forms but a small fractional part of the total pressure of the works." and what is equally clear, the anti-dip apparatus employed by Mr. Copp simply gets rid of the pressure due to the dip, and does not in any way assist in ridding the retorts of the pressure due to the weight of the holder, resistance of purifying material, station-meter, &c., which, together, I should think, would leave, say in a very small work like Watchet, a pressure of three or four inches, for it is plain that, without an exhauster, the avoidance of the dip does not obviate the pressure caused by the other portions of the apparatus through which the gas has to pass. In contradistinction to Mr. Copp's statement, I have my own experience, and have found that with only half an inch pressure in the retorts, the deposition of carbon takes place, and to such an extent that the cleaning or scurfing of them has to be effected every five or six months. I cannot, therefore, understand how Mr. Copp can so completely get rid of this difficulty if he has five or six times the amount of pressure more than that under which I conducted my experiments.

It appears that Mr. Copp does not speak quite so strongly *now*, for in his letter, in your issue of the 7th inst., he says that "the formation of carbon has been in exact proportion to the back pressure from the works." With this I agree, and as readily, and for the same reason, disagree with his former statement—viz., "I have had these valves in use for more than 15 months, and my experience is, after a careful and thorough test, that the deposit of carbon is completely prevented; and I have never had to scurf a retort since." These varying statements speak for themselves; and as the proposed means are not self-acting, and cannot offer perfect safety against the return of the gas to the retorts, I am of opinion that, the hydraulic seal being safe and efficient in its action, and ensuring such perfect freedom from risk or accident, weighty reasons exist against its disuse, at least, until a substitute can be found offering its advantages without the doubtful and hazardous benefits which are promised by the other means. The relieving retorts of pressure while working is *not* desirable, for I have proved over and over again, that by such a system of manufacture, various evil results are produced. By the Messrs. Chandler and Stevenson's self-acting dip, they are in a great measure avoided; but it appears to me that no provision is made to prevent the back-flow of the gas to the retorts should the exhausting apparatus become suddenly deranged. The pressure of gas in the ascension-pipe raises the holder, lifting the dip-pipe out of the liquid in the hydraulic main, and a sudden back-flow of the gas would as readily *return* through the dip-pipe, and so keep the holder before mentioned in its elevated position. In its normal state of working I have no doubt it has many advantages, as it does not wholly remove the pressure from the retorts, and depends upon the liquid in the hydraulic main for safety and use in its application.

Birmingham, Nov. 11, 1876. FRANCIS J. W. HAYES.

SIR,—I notice in the last issue of the JOURNAL OF GAS LIGHTING, p. 662, a statement denouncing the possibility of working with a half-inch seal in the hydraulic main, without the specified patent dip-pipe.

I must in fairness say that I have never tried to work the half-inch seal; but, for the benefit of those that are about to build new works, or make extensive alterations, I will state my views on this important question.

It is now six years since we had occasion to reconstruct our works, and I have always paid particular attention to the hydraulic main, but in this case rather more than usual. At first I made up my mind to have, as I thought, a very large hydraulic main 2 feet 6 inches in width, and the usual depth—18 inches. After this I altered my mind, and, to save a trifling expense of outlay, I had it 2 feet wide only. At this very point I made a sad mistake. Had I been wise enough to have added on 6 inches more, and made it 3 feet wide, I should have been in the right direction, and could have easily worked with the half-inch seal, as it is a large surface that is required at the immersion of the dip to work with a small seal, and at each length of main insert a blank disc between the flange joint. This divides the main into short sections, and instead of having a long run of main you have only 14 dip-pipes to deal with. Next, with the main 2 feet wide and 18 feet long, and a ¾-inch seal, we have 5184 inches of water to seal the 14 dip-pipes. This will seal each pipe 10½ inches, or nearly so, when the works are stopped; but when the retorts are in work—say, one bench—this would reduce the number of pipes required to be sealed, and if the two benches, there would be only the retorts that are slacked back for drawing and charging that require to be sealed. In my case the back pressure is 6 inches — viz., gasholder 4½ inches and purifiers 1½ inch. This being a fact, I resolved to set a fixed seal at three-quarters of an inch, and I am pleased to say it has worked admirably well for six years, and I never once had occasion to alter the three-quarter inch seal. I may say that I provided means to give the pipes more seal, if required, in a few minutes. Some time ago I had two benches to fit up, and seeing such glowing accounts set forth in the JOURNAL and circulars sent abroad, stating such astounding facts, I was determined, if possible, to test the truth of the patent dip-pipes, and selected three of the best inventions, as far as I could judge, to see if I could make an agreement with one of them to fit up the two benches with the patent dips. I wrote to each one (*names omitted*) of them. The terms, I thought, were very easy—viz., Will you guarantee me 500 feet of gas per ton of coals more than I am making, taking the twelve months working from the carbonizing book? I did not wish to enter into all the other advantages held forth, I only treated for the gas. This each one declined to enter into an agreement for, but I was politely informed that no doubt if I adopted the patent dip I should derive a great benefit by its use. So, after this reply, I set to and fitted up the benches in my usual way (with the ¾-inch seal). Here I must leave engineers and managers to form their own opinion; my own is that the patentees do not like the sound of a ¾-inch seal. Had I been working with a 4-inch seal, or more, probably my offer would have been readily accepted.

R. GOOD, Manager.

Carshalton Gas-Works, Surrey, Nov. 16, 1876.

SIR,—Mr. Copp having ventured into your columns, with a proposal affecting gas manufacture, I should like to make a few observations respecting his apparatus. The business of a gas manufacturer is already attended with a very considerable amount of responsibility, and Mr. Copp's proposal will, I fear, in no way lessen the difficulties with which a gas manager has to contend, but, on the contrary, rather increase them. In practice, it is frequently found that a retort, when charged, is apparently sound, but upon discharging it a hole or gap is discovered; and it appears to me that Mr. Copp's anti-dip in such a case would prove a serious evil, and not a blessing. The reason is clear—not only would the gas be lost which that particular retort had made, but the gas from the other retorts, or even from the holder itself, might as easily find its way through the said hole into the flues, and so escape and be lost. Upon looking at the drawings of Mr. Copp's anti-dip, I find that there is absolutely no provision for such an important requirement when bye-passing the gas from the dip-pipe. If it should be answered that the exhauster would not permit the gas to return in the manner described, my reply is, that there are many works without an exhauster, and in those cases where they are used another serious difficulty arises. If gas can *escape*, air, &c., can also *enter* the retorts by the same means or thoroughfare; and with an exhauster one of two evils would most certainly ensue, according to the condition of speed—if too slow, the gas would escape; if too fast, the gas would be fouled by extraneous and sulphurous matters being drawn into the retorts from the fires. Another objection to Mr. Copp's anti-dip is to be found in the fact of its not being self-acting.

Gas stokers are not always to be depended upon, and with a little carelessness, oversight, or purposed retaliation for a fancied grievance upon their part, any anti-dip not self-acting, places in their hands a most undesirable power to work mischief, resulting in loss, which would probably, in a few hours, nullify the benefits (if any) of many months work. And even apart from this view of the case, the feeling of uncertainty, to which such a plan must give rise, is sufficient to make practical gas managers hesitate ere they commit themselves to further unnecessary anxiety and risk. I do not write for the purpose of opposing "another stride in the march of progress," as Mr. Copp terms it, but in the hope that each step taken may be in the direction of substantial improvement, rather than into the region of doubt, danger, and probability in which Mr. Copp's anti-dip is, I fear, destined to land those who use it.

A. R. GRENFEL.

Swansea, Nov. 14, 1876.

SIR,—In your issue of the 7th inst., Mr. Copp writes that he can, by the use of his anti-dip valves, "produce 500 to 1000 cubic feet increase," and I presume he means per ton of coals carbonized. For some time before the anti-dip was introduced, I had in use a bye-pass dip arrangement, exactly similar in action to Mr. Copp's, *minus* the pump-valve. This I was reluctantly compelled to abandon, finding that the sudden exit of the gas from the retorts was not attended with the advantages I had anticipated; in fact, it was often impregnated with deleterious compounds to an almost incredible extent, and the illuminating power frequently reduced from *sixteen* to *nine* candles, in the most sudden and unexpected manner. Such was my experience, and I cannot see how different results can be obtained if the gas be made under such conditions.

It is true there was undue exhaustion at times; but, in working, this could not be avoided. Any person may easily fix a bye-pass to the dip-pipe, and prove what I say, if he thinks it worth his while to do so.

RHWY BETH GWELL YN RISIAN.

Aberystwith, Nov. 17, 1876. (Something better wanted.)

SIMULTANEOUS PHOTOMETER CLOCK AND METER ACTION.

SIR,—With your permission, I beg to inform the two gentlemen engaged in the cock-fight, of other two cocks, attached to a lever, which do two or four things by a simple movement of the hand. They act in three cases as follows:—1. The bye-pass is opened, and an eight-day timepiece is stopped at zero. 2. The bye-pass is closed, the meter and timepiece are set to work. 3. The bye-pass is opened, timepiece and meter stopped, and the candles extinguished. Each case by a simple movement of the hand, and at once. The clock is about 2 feet from meter, toward centre of rail; the simple handle is on the front of the balance-case.

This contrivance is by Mr. J. Wilkinson, Grimesthorpe, and has been in use for several years.

N. S.

LIMERICK GAS UNDERTAKINGS.

SIR,—In your issue of the 14th inst., you say that you "shall be very happy to publish the real facts as regards the two gas companies in Limerick." I now give them to you, as I find them published in the last reports of the two rival institutions—the United General for the year ended Dec. 31, 1875, and the Corporation for the year ended June 30, 1876.

The United General—			
Capital subscribed	£36,000	0	0
Receipts from all sources	9,105	9	3
Net profit	919	1	3
Corporation Company—			
Capital	31,331	5	8
Receipts from every source	9,740	1	8
Net profit	1,419	17	7
Last valuation under the Poor Law—			
United General—Works and mains	600	0	0
Corporation—Works and mains	710	0	0

The capital of the Corporation Company includes the *purchase in* 1856 and *every shilling* that has been advanced since to the undertaking from the city rates. These figures will tell their own tale. I have nothing to add.

W. SPILLANE, Manager.

Corporation Gas-Works, 34, William Street, Limerick, Nov. 16, 1876.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

SATURDAY, NOV. 11.

(*Before the* MASTER OF THE ROLLS.)

SAO PEDRO (BRAZIL) GAS COMPANY, LIMITED.

This case came before the court to-day, when it was ordered that the winding-up petitions be adjourned for six months, the provisional liquidator to continue in office in the meantime.

COMMON PLEAS DIVISION.—SATURDAY, NOV. 18.

(*Before Justice* DENMAN *and a Special Jury.*)

MARSHALL *v.* LE FEUVRE.

Mr. M'INTYRE, Q.C., and Mr. HORNE PAYNE were for the plaintiff; Mr. J. C. MATHEW and Mr. M'LEOD for the defendant.

This was an action which arose out of certain transactions between the plaintiff and defendant on behalf of a company formed in the year 1872, for the purpose of lighting the town of Tunis with gas, and Mr. Bower, their manufacturing engineer. The company in question did not succeed, and Mr. Bower made a claim against both plaintiff and defendant for the amount due to him. The matter was submitted to the arbitration of Mr. R. V. Williams, on whose award judgment was signed against the plaintiff and defendant in this action. The plaintiff now alleged that, though the defendant was jointly liable with him in respect of this debt, he had not paid the full proportion due from him, and the difference had, in consequence, been paid by the plaintiff. The defendant, in effect, denied that he was jointly liable with the plaintiff to Mr. Bower, and also made a counter claim against the plaintiff in connexion with the same matters. A great number of transactions in money and securities between plaintiff, defendant, and Mr. Bower were gone into, and the effect of certain alleged agreements between the parties at the time of the formation of the company were disputed. The hearing of the case lasted from Thursday to Saturday, but presented no features of any general interest. The entire claim of the plaintiff amounted to £1080, and eventually, on the finding of the jury, the verdict was entered for £80 19s., with leave to the plaintiff to move to increase it by £1000, if the court think him entitled to do so on the facts and findings.

WORSHIP STREET POLICE COURT.—WEDNESDAY, NOV. 15.

(*Before Mr.* HANNAY.)

WRONGFULLY DISCONNECTING A METER.

Edward Swain, a gas-fitter, appeared to a summons, taken out by the Commercial Gas Company, for unlawfully damaging a gas-meter, the property of the company.

Mr. CHARLES YOUNG, solicitor, who appeared for the prosecution, said that under the 18th clause of the Gas-Works Clauses Act, 1847, a person who was guilty of removing or disconnecting a gas-meter was liable to a fine of £5.

Mr. HANNAY said it seemed to him that the clause applied where the intention was to obtain the gas fraudulently.

Mr. YOUNG said that was so, but the clause was in the disjunctive. By the 19th section a person damaging any pipe or meter by filing it or cutting it, was also rendered liable to a fine of £5 and the amount of the damage. The company had taken these proceedings simply to show the defendant and other men, calling themselves "gas-fitters," that they were liable.

Mr. *Charles Buckingham* said he was in the employment of the company. On the 3rd of November the defendant called at the office and brought with him a meter belonging to the company. Witness asked him where he had come from, and he said from Mr. Cooper, landlord of the "Duke of Edinburgh" public-house, Devonshire Street, Mile End. He stated that he had been called in to attend to a defect in the meter, the landlord being unable to obtain a full supply of gas; that he had disconnected the pipe, and that, in fixing it again, the flame got near the meter and it blew up. Witness told him that he had done wrong, and that he had no business to touch the meter without notice to the company. The defendant also admitted that he had, after the explosion,

made a connexion with the main by an india-rubber tubing, so that, as a fact, the landlord of the house burnt the gas that night without any register of it being taken.

Mr. YOUNG said the defendant was not summoned for that. For that matter, and the damage done to the meter, Mr. Cooper, landlord of the house, had settled. A summons had been taken out against him, but would be withdrawn.

The *Defendant*, in answer to the charge, said he had no questions to ask the witness. What he had done was in the course of his work, and the blowing up of the meter was an accident. As for connecting the pipe with the main, he had no fraudulent intention.

Mr. HANNAY said there was no charge of that kind against him.

Mr. YOUNG repeated that the only wish of the company in the matter was to have it understood that men were not to disconnect gas-pipes and meters without previous notice to the company, and to protect the public from being blown up, and damage being done, for which the company might afterwards be sued.

Mr. HANNAY said, of course, it was important for the public safety. He thought in this instance the justice of the case might be obtained by a small fine, and ordered the defendant to pay 5s., and 2s. costs.

The money was paid.

Miscellaneous News.

GAS AND WATER COMPANIES ASSOCIATION.

REPORT OF THE COMMITTEE FOR SESSION 1876.

Several bills having been before Parliament in the session just passed, the provisions of which, if generally adopted, would have an important bearing on the future interests of gas and water companies, the committee of the Association think it desirable to direct the attention of the companies thereto. These are as follows:—

1. The Municipal Corporations (Borough Funds) Bill.
2. The Burghs (Scotland) Gas Supply Bill.
3. The Pollution of Rivers Bill.
4. The Stockton and Middlesbrough Water Bills.
5. The Operation of the Public Health Act, 1875.
6. The New Regulations of the Metropolitan Gas Companies.

1. MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

In the early part of the session, a deputation of town-clerks had an interview with the Home Secretary and the President of the Local Government Board, relative to an alteration of the Act of 1872, and subsequently a bill was introduced by private members, at the instance of the corporations, to amend that Act, by repealing the provisions requiring the consent of the ratepayers in the manner provided by the Local Government Act, 1858, but as Government did not adopt the bill it never passed the second reading. It was on the list of "the orders for the day," with four notices of motions, "that it be read that day six months," no less than ten times, but never came on, and ultimately was withdrawn, with an intimation that it would be re-introduced next session. If this be so, it will call for the special attention of the Association.

2. BURGHS (SCOTLAND) GAS SUPPLY BILL.

This bill, as its name denotes, relates solely to the supply of gas in Scotland. It was first introduced by private members in 1875, when it contained powers for the compulsory purchase of all the gas companies in Scotland, whether incorporated or unincorporated.

The attention of the Scotch companies was immediately directed to it by the Association, and thereupon they sent deputations up to town. These deputations had several interviews with the promoters, remonstrating against the great injustice of taking compulsory powers for purchasing private property in this arbitrary way, without giving notice to the owners or any one else connected with the property, and pressing for the abandonment of the bill altogether.

The promoters, however, would not consent to this, but in the end agreed to withdraw the bill for that session, upon the understanding that it would be re-introduced in the next, excluding the incorporated companies, and accordingly it was re-introduced in that shape in the last session, and passed.

As some of the provisions of this Act are very special, and attempts may hereafter be made to introduce them into England, the Association consider it desirable to call attention to them. It provides—

1. That the powers of the Act shall not be exercised in any district over which, or any part of which, any local authority or company may have statutory powers to supply gas.

2. That where a district, or any part of a district, is not supplied with gas, the local authorities may erect works, and supply gas for public and private purposes therein.

3. That where a district, or any part of a district, is already supplied, but not under statutory powers, the authorities, before exercising any of the powers of the Act, are to give notice to the company by whom the supply is furnished, that they wish to purchase their undertaking, and if the company are willing to sell, but cannot agree upon terms, the terms are to be settled by arbitration; but if the company decline to sell, the authorities may have and exercise all the powers of the Act, the same as if there had been no supply—that is, erect works, and supply gas for public and private purposes themselves.

4. That the illuminating power of all gas supplied under the provisions of the Act shall be 14 candles.

As any authorities who might supply gas under this Act would be supplying gas under statutory powers themselves, they would be able to stop any company, not under statutory powers, from opening the ground, and thus put an end to their operations. The effect of the Act is, therefore, to give to the local authorities a compulsory power of purchasing the undertakings of the unincorporated companies upon arbitration terms, to be exercised or not as they think fit.

The bill, when first introduced in the last session, although it excluded the incorporated companies, was in a very different shape to what it is now. It was much opposed by the Association on behalf of the Scotch companies, but certain amendments being agreed to with the promoters, who undertook to alter the bill when it went into committee, it was allowed to go to a select committee (not open to the public) without opposition; but on the bill being reprinted, as amended, it was found that the agreement made with the companies had been entirely set aside. The Scotch companies were then communicated with again, and both the incorporated and unincorporated companies sent deputations to London.

These gentlemen had several interviews with the promoters and some of the chief members of the committee, and pressed for the bill being either withdrawn or amended as agreed, and ultimately the bill was referred by the House back to the same committee, when it was amended conformably to the original agreement.

While these negotiations were pending, the effect of the provisions respecting the unincorporated companies was pointed out to the representatives of those companies, but nevertheless they approved of them, saying they considered that if the unincorporated companies would not sell their undertakings on arbitration terms, they were not entitled to any protection.

From the statements made by these gentlemen, it appears that gas is much more extensively used for domestic purposes in Scotland than in England, that in many places it is laid on in the small cottages occupied by the agricultural labourers.

3. POLLUTION OF RIVERS BILL.

This bill was promoted by Her Majesty's Government in the last session, and passed.

The object of the bill is, as its title imports, to prevent the pollution of rivers.

It defines rivers to mean rivers, streams, canals, lakes, and watercourses, except such as are used as sewers, emptying directly into the sea, and, in certain events, the sea and tidal waters to such points as may hereafter be determined by the Local Government Board.

And it prohibits—

The carrying into or the knowingly to permit the carrying into such rivers, &c., either to pollute or to interfere with the due flow thereof,

Any solid or liquid sewage or putrid solid matter, or waste solid refuse, rubbish, cinders, &c.,

Or the drainage from mines, quarries, manufactories, &c.

The sanitary authority of the district is to enforce the Act. Persons aggrieved are to apply to the sanitary authority, and if they refuse to act, application is to be made to the Local Government Board, who may direct the sanitary authority to proceed.

4. STOCKTON AND MIDDLESBROUGH WATER BILLS.

This is a case in which a power has been given to a corporation to purchase compulsorily the undertaking of a water company, and as the committee believe this to be the first and only instance in which a direct compulsory power has ever been given, they desire to call the special attention of the companies to the facts under which the decision was given.

Two private bills were introduced in the usual way.

One entitled the "Stockton and Middlesbrough Water-Works Bill," and

The other the "Stockton and Middlesborough (Corporations) Water Bill."

The first was promoted by the existing company, for powers to raise £300,000 further capital, to enlarge their present pumping-station, and take more water from the same place on the river Tees for extending their supply.

The second by the two Corporations of Stockton and Middlesbrough jointly, for powers to purchase compulsorily the undertaking of the water company, and to change the source of supply and construct large compensating and storeage reservoirs on the upper reaches of the river, far above the spot where sewage was poured into the river, and above all sources of pollution, and to expend £700,000 for that purpose.

The two bills occupied in the two Houses a very considerable portion of the session, and attracted very great attention. They were taken in the Commons first, referred to the same committee, and after a very protracted inquiry, the bill of the company was rejected, and that of the corporations passed; the Corporations Bill went up to the House of Lords, where it was opposed by the company, but after a second very protracted inquiry, the Lords confirmed the decision of the Commons.

It appears from the proceedings that the company introduced a bill for the same objects in 1875. That the Corporation of Middlesbrough opposed the bill, on the ground that the water supplied by the company was unwholesome, and the source from whence it was taken much contaminated with sewage, and that as the company, instead of proposing to go to some other source, only proposed to increase their present plant, and take a larger quantity from the same source, their bill ought to be rejected, so that they might bring in a proper bill in the next session, the corporation intimating that, if the company refused to do so, the corporation would do so themselves; and thereupon, after a lengthened inquiry, extending over 15 days, the committee decided unanimously that the preamble was not proved.

The counsel for the corporations, on opening the case for the Corporations Bill in the last session (1876) said:—

"I should not feel confident in bringing forward this case if it was a bill simply to transfer the property of the water company to the corporation. This is incidental and indispensable to the main purpose of the bill; but the main purpose is to substitute for the water now supplied by the company, which is anything but satisfactory to the inhabitants, a perfectly pure and wholesome water. The company, in fact, propose to continue their present source, while the corporation propose to seek another, far above all source of pollution.

"It has now become urgently necessary to increase the quantity of water supplied, and as the inhabitants of Stockton and Middlesbrough have become more and more discontented, and, I may say, are now unanimously discontented with the quality of the water supplied, it has become equally necessary to improve the quality.

"When the company applied for power last session to take an additional quantity of water from the river Tees, they were opposed by every public body in the district.

"Above the point where the water is now taken from the river there is a population of 12,000 inhabitants in several towns and villages; the largest town being Barnard Castle, which discharges all its sewage into the river.

"The company are now trying over again exactly the same issue as that which was tried and decided adversely to them last year, knowing exactly what the grounds of the objection of the public bodies were; knowing that the public bodies were prepared to lay before this committee the same kind of evidence as satisfied the committee last year that the bill ought not to be granted. In fact, they are asking Parliament to reverse the decision of last year, while we, I may say, are asking Parliament to give it effect.

"We should not have had a bill before Parliament this year if the company had proposed a satisfactory scheme, conformable to the views of the committee of last session. We gave them notice that if they would not bring forward a satisfactory scheme—and they knew well what was required, because it had been, over and over again, pointed to in evidence—the Corporation of Middlesbrough would do so."

The committee of the Association think, when an existing source of supply is very generally disapproved of, and a company does not feel justified in incurring the large expense of going to another source, while a corporation is willing to do so, it can hardly be expected that Parliament will refuse to a corporation the necessary powers for that purpose; and, therefore, taking all things into consideration, that this is a very exceptional case, and one that ought not to be looked upon as a precedent for a general compulsory power.

The terms upon which the purchase is authorized are as follows:—

"Sec. 15. The corporations shall, within six months after the passing of this Act, by writing under their common seals, addressed and sent to the secretary, or delivered at the principal office of the company, require the company to sell, and the company shall thereupon sell to the corporations, all their undertaking, property, rights, powers, and privileges, as the same exist at the time of the delivery of such notice, for such consideration either in perpetual annuities amounting to eighteen thousand six hundred and forty-seven pounds, the present maximum statutory dividend of the company, or, at the option of the company, for a sum in gross, calculated at twenty-five years purchase, of such sum, and in addition to the sum in gross, or on perpetual annuities to be paid to the company, the corporations shall take over and pay the statutory debt of the company at the time of the transfer and vesting of the undertaking in the joint board, and all other the debts and liabilities *bonâ fide* incurred by, or on behalf of, the company for the time being, and also shall pay to the company a sum for compulsory sale, and for the prospective value of company's undertaking; and if any difference shall arise in carrying into effect the provisions of this section, the same shall be settled by arbitration, in ac-

cordance with the provisions of the Lands Clauses Consolidation Acts, 1845, 1860, and 1869."

When the Corporations Bill went up to the House of Lords, the Association sent a form of petition against the principles of the bill to their subscribers, and a large number of petitions were sent up from the different companies and presented against the bill; but as the forms of the House did not admit of any action being taken upon the petitions, they had no effect.

5. The Operation of the Public Health Act, 1875.

It will be recollected that by this Act, passed in 1875, the Local Government Board were empowered to grant Provisional Orders to local authorities for constructing works and supplying gas and water within their respective districts when there was no other supply, or when the company which furnished the supply were not under statutory regulations.

The Board of Trade have for some years past had the power to grant Provisional Orders for similar purposes to companies or individuals.

The session just passed (1876) was, therefore, the first in which these double powers to the Board of Trade and the Local Government Board came into operation, and the following is an illustration of what took place:—

A corporation of a town on the south coast of England that had been supplied with gas by a company (not acting under statutory powers) for the last 40 years, quarrelled with the company about the price, had the gas cut off from the public lamps, and the lamps supplied by paraffin; and then gave notice to the company that they should apply to the Local Government Board for a Provisional Order to construct works and supply gas, for public and private purposes, themselves within their own limits.

As the company had some time previously given notice of their intention to make a similar application to the Board of Trade, both parties made application when the proper time arrived—the corporation to the Local Government Board, and the company to the Board of Trade—and both parties deposited draft orders, in which the price, illuminating power, and other terms were precisely the same.

In due course both parties presented memorials against each other's application.

The corporation on the one hand, in their memorial against the application of the company, alleged—

That the gas supplied by the company was bad in quality, deficient in quantity, and the price charged was unreasonably high, &c.

That the price proposed by the draft order was excessive, and the illuminating power too low, notwithstanding the fact that they had themselves proposed precisely the same.

That the corporation were willing to purchase the company's undertaking upon arbitration as to structural value; but they objected to the principle of arbitration being applied generally to the purchase.

The company, on the other hand, in their memorial against the application of the corporation, alleged—

That they had supplied gas to the town for more than 40 years. That at the commencement of their undertaking the consumption of gas was not such as they had expected, and the return was unremunerative, and that although the dividend was 10 per cent. at the time, it had only been so for the last few years, and the average for the whole time was only 6¼ per cent.

That the company had only increased the charge for the public lamps in consequence of the high price of coal.

That the company had since made a variety of proposals to the corporation for continuing the supply on very low terms, and had offered to sell their undertaking to the corporation on terms to be settled by arbitration.

That the corporation had rejected all the company's proposals, and declined to purchase their undertaking unless the arbitrators award was limited to structural value only, which the company had, as a matter of course, declined.

After the two memorials had been presented, the secretary of the Association, who was the parliamentary agent for the company, called at the Board of Trade, to point out that unless the two departments could agree upon some joint action, both orders might be granted in the first instance, the bills to confirm the orders be introduced into different Houses, and referred to different committees, and that if this were done it would cause great and needless additional trouble and expense to all parties concerned.

The Board intimated that the possibility of such a casualty arising had been foreseen, and the matter had been under consideration for some time with a view to avoid it, but that nothing had then been determined upon; both departments, however, wished it to be understood that in cases where a local authority and a company applied for Provisional Orders at the same time, the inclination of both boards would be to give the preference to the local authority, unless some good reason could be shown by the company against it.

Some correspondence subsequently ensued between the Board of Trade and the Local Government Board, as to further proceedings, but in the end the application of the company was granted, and that of the corporation refused, the Board of Trade stating that it had been represented to them—

That the company had supplied gas for a period of 40 years, and that they had offered to sell their works to the corporation at a price to be fixed by arbitration; and that this offer had been refused by the corporation. Under these circumstances it appeared to the Board of Trade that it would be unjust to refuse an existing company parliamentary powers because a local authority wished to buy the undertaking without being able to agree upon terms.

6. The New Regulations of the Metropolitan Gas Companies.

The last contest between the local authorities and the gas companies of the Metropolis, which was commenced in 1875 by the Metropolitan Board of Works introducing a public bill to make all the companies supplying gas within a certain district of the Metropolis, subject to the same obligations and liabilities, or, as the Board were pleased to term it, "to establish uniform regulations for the whole Metropolis," was suspended for that session, but taken up again last session (1876), when some of the companies, but not all, agreed to adopt certain of the proposed regulations, and thus the matter for the time has ended, as other similar attempts have done before, in making the obligations and liabilities of the respective companies wider apart than ever.

As these new regulations differ in themselves to some extent, and it is understood that in some form or other they are to be the standard for all future gas legislation for the Metropolis, and hence it may be expected that they will be proposed for other places, the committee of the Association think it desirable to make the provincial companies fully acquainted with what they are.

The three Acts in which these new regulations are incorporated are—

1. The Commercial Gas Act.
2. The Gaslight and Coke Company's Act.
3. The South Metropolitan Gas Act.

In all three Acts, the mode of regulating the dividends by the price and the making up of an insurance and a reserve fund are the same, but in the mode of raising new capital, and other minor points, there is some variation.

As to Dividend and Price.

The provisions for regulating the dividend by the price are as follows, viz.:—There is a standard, or, as it is more appropriately termed, an initial price and dividend with a fixed illuminating power, and it is provided that if the initial price be reduced the dividend may be increased, but if that price be increased the dividend must be reduced at and after the rate up and down of 5s., or one quarter per cent. of dividend for every penny of price.

The initial price and terms fixed in these three cases are 16 candles at 3s. 9d. in two cases, and 16 candles at 3s. 6d. in the other, with a dividend of 10 per cent. in all. If, therefore, this 3s. 6d. or 3s. 9d. initial price be raised to 3s. 9d. or 4s., that is three pennies in each case, the initial dividend must be reduced at the rate of 5s. for every penny, or 15s., so as to be only £9 5s.; but if, on the contrary, the price be reduced three pennies, that is to say to 3s. 3d. or 3s. 6d., then the dividend may be increased in the same proportion, and become £10 15s.

It has now for some time been the practice of Parliament to limit the dividend upon original capital to 10 per cent., and upon additional capital to 7 per cent., and by way of securing those dividends to the companies to authorize the making up of a reserve-fund equal to one-tenth part of the nominal capital of the company, with a provision for the protection of the public that when the maximum dividend has been reached, and the reserve-fund made up, all further profits shall be applied to a reduction of the price.

These regulations, however, have not as a rule equalled the expectations of the authorities in reducing the price. It has, therefore, been determined, at the suggestion of the Board of Trade, to repeal them so far as the metropolitan companies are concerned, and to prescribe those just quoted in their stead.

The regulation of the dividend by the price or by a sliding scale, as it is generally termed, is by no means new. It has been introduced into several gas Acts of late years, but not in this form; hitherto it has only been applied in cases where a company has not attained its maximum dividend of 10 per cent.—say, not more than 7 or 8 per cent.—when, as a compromise with the local authorities, it has been agreed that the dividend paid at the time shall not be increased until the price has been reduced, and that for every reduction of 2d. or 3d. per 1000 feet in the price there may be an increase of 10s. or 20s. per cent., as the case may be, in the dividend until it reaches the maximum of 10 per cent., but as this regulation could only be adopted by companies not having attained the 10 per cent., it has been of but very limited application.

The sliding scale granted to the metropolitan companies is, however, a very different thing to this. And inasmuch as it admits of the dividend going beyond 10 per cent., which, since the Gas-Works Clauses Act was passed, has never yet been allowed to any company, it is not only a great concession to the companies, but is capable of universal application, and open to all companies hereafter applying to Parliament that may see fit to adopt it.

In the case of the Commercial Company the shareholders of the 7 per cent. capital are to participate in the sliding scale to the same extent as the shareholders of the 10 per cent. capital.

In the case of the Chartered Company the sliding scale is limited to the 10 per cent. capital.

In the case of the South Metropolitan Company there is no other capital than 10 per cent.

The principle sought to be effected by this arrangement is this: If adverse times, such as those the companies have recently undergone, should come again, and the companies be compelled to go beyond the initial price, the companies themselves shall bear a portion of the burden, and not throw it all upon the consumers; or, on the other hand, if the companies by due care and management should be able to reduce the initial price, that they may participate in the advantages to be derived from that management, and not have to bestow them all upon the public as now.

The principle in itself is no doubt unobjectionable, but the advantage or otherwise of each particular arrangement will, of course, depend upon what the initial price may be, and whether the proportion of 5s. dividend for every penny of price is, in all cases, the proper one to adopt, one penny reduction on a price of 5s. would obviously be a very different thing to a penny reduction on 3s. 6d., and the lower the price gets the more difficult any further reduction becomes.

As to the Insurance and Reserve-Funds.

The present regulations as to reserve-funds are, that the surplus profits, after paying 10 per cent., shall be applied—

1. In making up a reserve-fund equal to one-tenth part of the nominal capital of the company; and
2. In reducing the price.

It follows, therefore, that when the reserve-fund has been made up, all surplus profit beyond is in a measure the property of the public, and hence the public may be said to have an interest in the management, but under the new regulations the public lose all interest in the surplus profit—in fact, no surplus profit, in the ordinary sense of the term, can arise, as all the profit, whatever it may be, is the property of the company, and may be dealt with in any way the company think fit.

With Respect to the Insurance-Fund—

It is provided as follows—viz.:

"If the clear profits of the undertaking of the company in any year amount to a larger sum than is sufficient to pay the standard rate of dividend, the excess beyond the sum necessary for that purpose may from time to time, to the extent of 1 per cent. upon the paid-up capital of the company, be invested in Government or other securities, &c., &c., until the fund so formed shall amount to one-twentieth part of the paid-up capital of the company, which sum shall form an insurance-fund, to meet any extraordinary claim, demand, or charge which may at any time arise against, or fall upon, the company from accident, strikes, or other circumstances, which, in the opinion of the auditor, due care and management could not have prevented." And

With Respect to the Reserve-Fund—

"If in any year the amount of the standard rate of dividend of the company on the ordinary share capital or stock of the company shall, by reason of a diminution of the standard price charged by the company in such year, be increased, then out of the amount of the divisible profits of the company applicable to the payment of such increase, the company may in such year set apart such sum as they shall think fit to be invested in Government or other securities," &c.

"And the fund so formed shall be called a reserve-fund, and shall be applicable to the payment of dividend in any year in which the clear profits of the company shall be insufficient to pay the standard rate of dividend on the ordinary share capital or stock of the company," which standard rate is defined as 7 or 10 per cent., as the case may be.

The effect of these different provisions is this: The insurance-fund may be made up out of the initial price, without its being reduced, but the reserve-fund cannot be made up until the price has been reduced, and the company become entitled to pay an increased dividend. Why there should be this difference in the mode of raising the two funds, or why there should be two funds when one could have been made so much more readily to answer the purposes of both, it is not easy to discover. Under these new regulations, a company might, without any special provisions for the purpose, either divide all the profits at once, or set apart a portion to form either an insurance-fund or reserve-fund, or any other fund they could agree upon; but as it was supposed that some shareholders, anxious to divide as much as possible, might object to the formation of any fund, and perhaps question the power of the company to make one, it was considered desirable to insert these provisions, so as to place the matter beyond doubt. With this explanation their insertion is intelligible, but bearing in mind that both funds would have to be made up out of profits applicable to dividend, and, consequently, be the absolute property of the company, it is not easy to ascertain why there should be these unnecessary regulations as to their appropriation; being the property of the company, their appropriation should be left at the discretion of the company.

The formation of both funds is simply permissive, there is no obligation upon the companies to form either one or the other.

As to New Capital.

All three companies are required to raise their new capital by instalments of one-fourth or one-fifth, as the case may be, and to raise with each instalment of shares an equivalent amount of loan.

That is to say, if a company is authorized to raise £1,000,000 in shares, it

must, in the first instance, raise (say) £250,000 by shares, then £250,000 by loan, then another £250,000 by shares, and another £250,000 by loan, and so on.

The Commercial Company are authorized to issue their new shares to their present proprietors in the usual way, but the other two companies are required to offer all their new shares for sale by auction or by private tender within the Metropolis, and to apply the premiums received therefrom to the purposes of capital, but without dividend.

As the shareholders, under this regulation, would derive no benefit from the issue of new capital, there would be no inducement to raise any more capital than was absolutely necessary, but, on the contrary, every inducement to keep it down to the lowest possible amount, and thereby strengthen and give a more substantial value to the capital already expended.

This, as respects new capital, seems at first sight to be raising share and loan capital in equal proportions, which would soon defeat itself by reason of the insufficiency of the security, but in reality it is not so, inasmuch as the premiums on the sale of the shares, when a company were paying 10 per cent., would be from 70 to 80 per cent., which would be invested with the other capital in the works, and brought into the capital account, although not receiving dividend; the proportion would be as £170 or £180 of shares to £100 of loan, or about one-third, which is the proportion allowed to railways, and the average interest paid by the public upon the total would be from 5½ to 6 per cent.

Two of the companies are authorized to double their present capital, about half a million each, in the proportion of one half by shares and the other half by loan, and the other company to raise two millions, about one-third of their present capital, in the same proportion of shares and loan.

All three companies are required, when they have raised certain portions (named in the Acts) of this new capital, to apply to the Board of Trade for permission to raise more; and the Board of Trade, before granting this permission, are required to entertain any objection the Metropolitan Board may raise against it.

The Board of Trade have power, under the Gas and Water Facilities Act, 1870, to grant Provisional Orders to Provincial Gas Companies for raising additional capital, but that Act does not apply to the Metropolis.

In the early part of these proceedings it was proposed by some of the companies that the Board of Trade should have the same power with respect to the London companies as they have already with respect to the provincial companies—that is, to authorize the companies to raise further capital, without incurring the expense of applying to Parliament; but these Acts require the companies to apply to Parliament first, for leave to raise the capital, and then to the Board of Trade for leave to spend it. And as there are no provisions in the Acts for regulating such applications, the Board might limit their consent to such small sums as practically to give them the entire control of all the companies future expenditure.

GAS AFFAIRS IN DUBLIN.

On Friday, the 10th inst., a special meeting of the Corporation of Dublin was held—the Lord Mayor presiding—to consider the reply of the Alliance Gas Company to a resolution of the council adopted on the 3rd inst.—in reference to the supply of gas to the city.

The Gas Committee presented a report on the subject, in which they quoted the following letter from the Gas Company:—

Alliance and Dublin Consumers Gas Company,
114, Grafton Street, Nov. 8, 1876.

Sir,—I am directed to acknowledge the receipt of your letter of the 4th inst., and in reply to state that my directors having given the subject contained therein most careful consideration, and entered into a minute calculation of the present cost of wages and materials, and seeing no prospect of a further reduction notwithstanding the unprecedented stagnation of trade, regret that they are not in a position to meet the views of the corporation, and alter the rates quoted in their tender of the 31st of May last. The directors, however, would be willing, if so required by the corporation, to submit a tender for the entire "public lighting service," including lamplighters wages, maintenance, &c., and they undertake that such tender will not exceed the average cost per lamp per annum paid by the local authorities of London.

I am desired again to call the attention of the corporation to the fact that should they desire to take advantage of the 14th section of the company's Act, and thereby authorize the directors to alter the standard to 14 candles (a standard two candles in excess of three of the London gas companies), in that case the price will be reduced to 3s. 7d. per 1000 cubic feet.

I have just learned that the Corporation of Cork are entering into a contract for 14-candle gas at 4s. 9d. per 1000 cubic feet, exclusive of all maintenance, &c., this price being the same to private consumers within the city.

(Signed) W. F. Cotton.

W. J. Henry, Esq., Town-Clerk, Corporation of Dublin.

The report also set out a letter from Mr. J. M'Evoy, the honorary secretary of the "Citizens Gas Committee," approving of the action of the corporation in asking a reduction of the price to the private consumer to 4s. 6d. from January next, and 4s. 3d. from July next, and suggesting that the price after next year should be 4s. The letter also proposed that, in the event of the company not acceding to those terms, an Act might be promoted for the purpose of compelling a reduction. The report stated that after considering these communications, the committee had passed the following resolution:—

That inasmuch as the letter of the gas company holds out no prospect of the proposals of the corporation being acceded to, and Mr. Fitzgibbon's opinion shows that no means exist under the existing Acts for enforcing any reduction of price, the council be recommended to undertake to promote an Act in the ensuing session, provided the expenses thereof be subscribed or properly guaranteed between this and the 17th inst., to the extent of £2000.

That a select committee be appointed in the meantime to draft a bill to amend the Act of 1874, so as to reduce the cost of gas of the quality now supplied in Dublin to what it would be if that Act had not passed. That the council adjourn to Thursday next, for the purpose of finally deciding whether or not it will promote such an Act.

That the directors of the company be informed that while the council, as representatives of the citizens, consider it its imperative duty to identify its interests with those of the general consumers of the city, it is most anxious to avoid all disputes and come to an amicable arrangement, which while protecting the interests of the public, will also pay due regard to those of the company, and that the directors be requested to meet a committee of the whole house in conference on Monday next, at two o'clock.

Sir J. Mackay, chairman of the Gas Committee, moved the adoption of the report, which was seconded by

Mr. Gray, who suggested several verbal alterations in it, and recommended that the consideration of the merits of the case should be deferred until the following day. He also submitted to the council the names of certain members to form the committee for drafting the proposed bill.

Mr. Byrne, who was one of the members so nominated, requested that his name might be taken off the list. His recollection of the relations of the corporation with the Chamber of Commerce was of such a nature that he found it impossible to weld the two bodies into one harmonious whole. They were not able to work with them in consequence of the slight put upon them by the corporation in striking their names out of the Gas Committee when the bill was before Parliament. His view upon that point was that the proposed combination would be ineffectual and abortive. Moreover, if the persons who composed the Citizens Committee of the Chamber of Commerce were persons who ought to be consulted and brought into prominence, they were the persons who ought to be members of the corporation. The proposal, he considered, was an admission of the incompetence of the council to deal with important matters connected with the city; but he would not further oppose the project than to refuse to serve on the committee for the preparation of the bill. He did not think it would be for the advantage of gas consumers—he thought it would rather lead to their disadvantage, when he took into account that for three years the gas company paid no dividend, and that for one of those years they spent over £18,000 in producing gas more than they received for it, and when he took into account that that case would be made by them before Parliament, and that Parliament would say the corporation and the Citizens Committee were before Parliament in 1874, and an adjustment, calculated at that time to last ten years, was entered into.

Mr. Gray's suggestion having been adopted, the council adjourned until the following day, Saturday, the 11th inst., when

Mr. Gray, in a speech of some length, moved the adoption of the recommendations of the Gas Committee, with his amendments and additions. Going back to the year 1866, he traced the history of legislation in respect to the Dublin gas supply, indicating the course which had throughout been pursued by the corporation, and commenting on the provisions of the Acts of 1871 and 1874. He replied to the charges made against the council, of apathy on the one hand, and breach of faith on the other in reference to this question. The corporation had always been ready to protect the interests of the citizens—they were the only body who could take action in this matter—and that they were justified in doing so he maintained from the fact that the Act of 1874 did not carry out the avowed intention of its promoters. The preamble of the Act declared that, on account of exceptional circumstances, it was desirable to amend the conditions under which gas had previously been supplied in Dublin, and to provide for a revision of price according to the variations in the cost of material. But when they came to look at the operative clauses of the Act, they found that the only revision provided was in the interests of the company, in the event of an advance in the cost of manufacture, and that there was no corresponding right on the part of the public to ask for a reduction in the event of the cost being reduced. There were other objectionable points, too, in the Act of 1874, which was deceptive, and, therefore, he contended, the corporation had a moral right to go before the Legislature and ask for an amendment. But the corporation were not in a position to promote a bill in Parliament next session at the expense of the ratepayers, the time for the necessary notices having expired; they could only do so if aided by private funds, and he had no doubt that those funds would be guaranteed.

Alderman M'Swiney seconded the motion, which led to a long debate, in the course of which

Mr. Gunn, while admitting that, in his opinion, the price charged for gas was too high, and that the subject was a proper one for the council to take up, said he thought they should confine themselves at the present time to the question of the contract for the public lighting. He did not think the members should be asked to incur personal responsibility in connexion with the proposed new legislation, and he warned the council against entering upon a parliamentary campaign with the prospect of the fierce and able opposition they would meet with from the gas company. Moreover, he strenuously protested against the council seeking the co-operation of either the Chamber of Commerce or the Citizens Committee; and, believing that if they made a fair offer to the company for the public lighting, it would meet with fair consideration, he moved as an amendment—"That the consideration of the resolutions be postponed until the council have deliberated upon the subject with the Alliance Gas Company."

Alderman Gregg seconded the amendment, as it was substantially what he himself had proposed in committee of the whole house. With reference to the contract between the company and the corporation, a fair offer had been made and declined, and now, instead of trying to come to closer quarters, they were threatened with parliamentary proceedings, at the personal risk of every member of the council having to put his hand into his pocket to meet the costs. If the citizens desired a change in the price of gas, they were well able to take care of themselves. The Citizens Committee succeeded, in 1874, in defeating the corporation project for acquiring the company's works, which would have brought in a revenue of £30,000 a year to the city, and they ought to be well able to defeat a simple company—if there was now such a body as the Citizens Committee at all, of which he had his doubts.

Mr. Byrne proceeded to reply to some passages in a pamphlet on the subject, published by Mr. M'Evoy, and he warned the council against precipitating proceedings in Parliament against the company, the costs of which would far exceed the £2000 for which a guarantee was to be asked.

At the close of the debate, Mr. Gray proposed his resolution in this form:—

That the council be recommended to consider the propriety of promoting an Act in the ensuing session, provided the expenses thereof be subscribed or properly guaranteed between this and the 17th inst. to the extent of £2000. That a select committee be appointed in the meantime to draft a bill to amend the Act of 1874, so as to reduce the cost of gas of the quality now supplied in Dublin to what it would be if that Act had not passed, and if the price for the present quality of gas were proportionate to the price fixed by the company in its previous Act of 1871 for the quality of gas specified therein, and to provide for an equitable revision from time to time. That the select committee for drafting the bill to be the following:—Aldermen M'Swiney and Sir James Mackey; Councillors Dennehy, Sykes, Gunn, Ignatius Kennedy, Fry, Byrne, Bury, and Gray, with power to add to their number; and that it have the bill and notices ready by Thursday next, and report to the council on that day. That the council adjourn to Thursday next, for the purpose of finally deciding whether or not it will promote such an Act. That the directors of the company be informed that while the council, as representatives of the citizens, considers it its imperative duty to identify its interests with those of the general consumers of the city, it is most anxious to avoid all disputes, and come to an amicable arrangement, which, while protecting the interests of the public, will also pay due regard to those of the company; and that the directors and their secretary be requested to meet a committee of the whole house in conference on Tuesday next, at half-past two o'clock.

The resolution was declared to be carried unanimously.

On Tuesday, the 14th, the chairman and secretary with several of the directors of the gas company, had a long conference with the corporation in committee of the whole house, but no result was arrived at.

On Thursday a special meeting of the corporation was held to receive the draft of the Gas Act Amendment Bill, and to decide whether such a bill should be promoted.

The Lord Mayor stated that a communication had been received from the directors of the gas company, which he would ask the town-clerk to read.

The Town-Clerk read the following:—

Sir,—The directors having had under consideration at their meeting yesterday the several proposals made by the corporation for the lighting of the borough, desire me to express regret that they cannot accede to them. With regard to the demand by the corporation for the reduction in the rate charged to private consumers, my directors are of opinion that the disposition they have already evinced on two occasions in voluntarily anticipating the statutory obligations of the company, and thus affording a reduction in the price of gas, should be a sufficient guarantee to the corporation that they would take advantage of the earliest opportunity to make a further concession, independent of any pressure being put upon them. My directors are not unmindful of the interest expressed by the corporation for the private consumers (for whom, however, I venture to assert the board of this company feel an equal anxiety), and with every desire to meet the views of the corporation as far as practicable, I am directed to state that if the corporation elect to be placed in the same position with respect to the public lighting of the borough as the local authorities of London or elsewhere—viz., to pay the same price for gas as private consumers, with cost for maintenance and for the use of the public lighting plant, my directors will consider most favourably the proposition of the corporation to reduce the price to private consumers to 4s. 6d. per 1000 cubic feet, commencing in January next (withdrawing their former tender). If this proposition be adopted, the directors will give a decided answer at one o'clock to-morrow. I am, therefore, directed to request you will lay this communication before the corporation to-day. In making this proposition, my directors are actuated by motives of economy, in order to avoid an expensive parliamentary contest, which it is more than probable would entail a loss of from £6000 to £7000. Allow me to add that the corporation have full power under several statutes to meet their case to prosecute an inquiry to ascertain if the present price of gas is reasonable.

(Signed) W. F. Cotton, Secretary.

Mr. Gray moved—"That the letter just read be inserted on the minutes

and that, in view of the friendly spirit evinced by the gas company, we offer 4s. 6d. per 1000 cubic feet for the public lighting, including maintenance, repair, and interest, the private lighting to be fixed at the same rate; that this offer be forwarded to the gas company, and that the council do adjourn till two o'clock to-morrow to receive the reply."

Mr. DENNEHY seconded the motion, which was put and carried unanimously, and the council adjourned till the following day.

On Friday, the 18th, an adjourned meeting of the council was held to receive the reply of the company to the terms offered on the previous day.

The TOWN-CLERK read the following letter from the secretary:—

Sir,—The board having had before them the resolutions passed by the Town Council yesterday, observe with satisfaction that the corporation have conceded the principle that public lighting should be at the same rate as private lighting. They are prepared during their contract to waive their claim for interest on the plant for lighting, but cannot consent to waive their charge (amounting to 9s. per lamp per annum) for repairs, maintenance, and painting of lamps. They, therefore, undertake to supply the public lighting of the borough at 4s. 6d. per 1000 cubic feet for a term of three or five years, except in the event of such exceptional circumstances arising as a general increase in the price of materials, freights, and labour, such as would warrant an increase in the price of gas. (Signed) W. F. COTTON, Secretary.

The LORD MAYOR said he hoped this letter would give them satisfaction.

Mr. GRAY objected to the charge for repair and maintenance of the lamps, and thought that unless better terms could be obtained the corporation should proceed with their notices.

Mr. GUNN was in favour of accepting the offer of the company if the item for repair and maintenance of lamps was reduced to 4s. 6d.

Mr. COTTON, the secretary of the company, in reply to questions, said that this charge was mere costs out of pocket. For the repair of the lamps alone they had a contract with the Gas-Meter Company at 3s. 9d. per lamp per annum, besides 4d. a lamp for governors, and the maintenance of pillars, standpipes, cocks, brasswork, and meters. However, to meet the views of the council as far as possible, he undertook to reduce the charge to 7s., and further, if they found it could be done for less, to give the corporation the benefit of it, He reminded the council of the large reductions volunteered by the company, and that there was comparatively no consumption in the city after six o'clock, when the shops were closed. In one line of mains in London, from Oxford Street to Camden Town, there was more gas consumed up to ten o'clock at night than there was in the whole Dublin district.

Mr. BROOKS, M.P., said he was very loth to interfere, but considering the smallness of the sum involved, the controversy between the corporation and the directors was assuming a rather unseemly character. He could not undertake for his colleagues to accept the offer now made, but he would strongly recommend it; and he thought they might rely on his assurance—the directors usually acted with so much cordiality, and there was so sincere a desire on their part to conciliate the council and to be liberal to the consumers, that he had very little fear that they would refuse to accept the proposition.

Mr. GRAY said, for one, he was willing to accept the terms. The proposition would involve about £700 a year more than Mr. Byrne's proposal in committee. The net result was that they had secured an advantage to the general body of consumers of £8000; and that the corporation, in consideration of hat, conceded £700 extra to the gas company.

After a long conversation on the precise form which the agreement should take, the general opinion of the council being in favour of the proposition as it now stood, the following terms were submitted by Mr. Gray:—

That, in consideration of the gas company consenting to a reduction in the price to the general consumer, the price for public lighting be fixed at 4s. 6d. per 1000 feet; the price for the private lighting to be reduced to the same from the 1st of January next within the borough; 4s. 6d. per lamp per annum to be paid for maintenance and repair of lamps, the contract to be for three years, and subject to revision as follows—that is to say: In case, owing to any variation in the price of materials or labour, the cost of manufacture in Dublin of gas shall be increased or reduced to the extent of 10 per cent., it shall be lawful for the company on the one hand, and on the other hand for the corporation, to demand that the said rates shall be increased or reduced proportionately to such variance in the cost as aforesaid; and, in the event of such demand not being complied with, it shall be lawful for the parties, or either of them, by notice in writing (either by the company to the town-clerk of Dublin, or by the corporation to the secretary of the company), to require that the matter shall be left to a decision by arbitration under the Companies Clauses Consolidation Act, 1845; and before the arbitrators so appointed, all persons interested in the increase or reduction of the price of gas may be heard, and the arbitrators may summon before them any person or persons whose evidence they may consider relevant to the issue; and may call on the company to produce all books, invoices, and documents in the possession, or under the control of the company, relating to the cost of the manufacture, in Dublin, of gas of the quality specified; and the award of the arbitrators, upon the question so referred to, shall be final, and the costs, if any, to be awarded shall be within the discretion of the arbitrators, one arbitrator to be appointed on either side in the usual way, with power to elect an umpire, whose decision shall be final.

Mr. GUNN seconded the resolution, Mr. COTTON having engaged to recommend its acceptance to his directors,

Mr. BYRNE suggested, but would not move it as an amendment, that an addition should be made in the terms, to the effect that no alteration should take place oftener than once in any twelve months, nor unless the price of material should vary to the extent of 10 per cent., the variation to be ascertained by arbitration.

The resolution was put and carried unanimously, and at the request of Mr. BYRNE, his suggestion was directed to be inserted on the minutes of the council.

The LORD MAYOR congratulated the corporation on the settlement of the gas question, and

The proceedings then closed.

CHEMISTRY OF COAL.—The second of a series of lectures to working men on the chemistry of coal was delivered at the School of Mines, South Kensington, on Monday evening, the 13th inst., by Professor Frankland. The natural sources of the elements which go to form coal were investigated, so far as regards carbon, in the first lecture; the second illustrated the decomposition of water, which furnishes the hydrogen found in coal. The properties of oxygen as a supporter of combustion, of hydrogen as a combustible, and of the mixture of the two gases in the proper proportions to form water, gave opportunity for performing several brilliant experiments, which were keenly enjoyed by the spectators.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—The quarterly meeting of members was held on Thursday, the 9th inst., at the Bedford Hotel, Southampton Row, London, and was well attended. The subject for discussion was—"The Washing and Scrubbing of Coal Gas." It was introduced by Mr. Eldridge, of Richmond, who dealt in an able and comprehensive manner with the various methods to be considered, but avowed himself to be a partisan of the Coffey-still principle of operation. A most interesting conversation followed, in which all the members joined, and which was maintained until the end of the sitting. Thanks having been voted to Mr. Eldridge, and to the president, the proceedings terminated.

HULL GAS SUPPLY.—Mr. James Baynes reports that the gas sent into the district of Sculcoates and Myton during October by the British Gas Company averaged a fraction over 16 candles illuminating power; free ammonia and sulphuretted hydrogen were at no time present to the ordinary tests. The results for the month are:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·35	15·65	16·06
Grains of sulphur per 100 feet	31·00	27·40	28·80

Mean barometer and temperature in experiment-room:—Bar., 30·06; tem., 61°.

BAHIA GAS COMPANY, LIMITED.

The Ordinary Half-Yearly Meeting was held at the Offices of the Company, 10, Coleman Street, London, on Tuesday, Nov. 14—EDWARD HORNER, Esq., in the chair.

The SECRETARY (Mr. Alfred J. Head) having read the notice convening the meeting, the following report and accounts were presented:—

The directors herewith present the audited statement of accounts for the half year ending June 30, 1876.

Mains sufficient to carry out the first two sections of the new system have been shipped, and the laying of them will be proceeded with as speedily as possible.

The profits for the half year, £4615 3s. 8d., added to the balance brought forward, makes the sum of £5066 12s. 3d.; out of which the directors recommend the sum of £1000 to be carried to the reserve-fund, and the payment of the preference dividends of 10 and 7½ per cent. respectively for the half year, and that a dividend of 3 per cent. per annum be paid on the ordinary shares. This will absorb £4625, leaving £441 12s. 3d. to be carried forward.

The directors retiring by rotation are Mr. Edward Horner, and Mr. Arthur J. King. The auditor retiring is Mr. Magnus Ohren. They are all eligible, and offer themselves for re-election.

Balance-Sheet, June 30, 1876.

Dr.				*Cr.*			
Capital—				Concession	£7,000	0	0
5000 ordinary shares .	£100,000	0	0	Investment to Dec. 31, 1875 .	95,621	3	11
1000 10 per ct. preference shares	20,000	0	0	Additional during half year .	320	9	10
1500 7½ ditto ditto . . .	30,000	0	0	Freehold land	4,705	2	7
Creditors—				Meters fixed.	3,068	5	10
On open accounts . . .	1,626	17	1	Office furniture and fixtures at Bahia and in London .	421	19	8
On acceptances	4,290	5	11	Preliminary expenses . . .	16,914	17	3
Dividends unpaid. . . .	126	12	9	Suspense account—			
Insurance-fund	47	4	10	Extension of retort-house, &c.	3,279	15	9
Reserve-fund	1,000	0	0	Amounts due for gas, fittings, &c.—			
Profit and loss.	5,066	12	3	Public lamps	1,500	6	1
				Ditto establishments . .	4,298	3	5
				Private rental, fittings, and coke	5,896	2	5
				Sundry debtors	108	18	10
				Stock—			
				Coals	6,709	19	2
				Coke	216	0	0
				Fittings	3,506	14	1
				Mains, lamp-columns, and other materials . . .	2,430	0	7
				Goods in transit	695	8	6
				Bills receivable.	4,000	0	0
				Cash at bankers—			
				General account. . . .	312	5	8
				Dividend account . . .	126	12	9
				Bahia	630	17	5
				London office.	25	4	3
				Bahia office	369	4	10
	£162,157	12	10		£162,157	12	10

Revenue Account for the Half Year ending June 30, 1876.

Coals carbonized	£5,810	9	6	Gas supplied to—			
Purifying materials . . .	200	17	6	Public lamps	£9,272	14	10
Carbonizing wages . . .	1,324	15	1	Less fines	239	18	9
Lamplighters wages . . .	843	4	11		£9,032	16	1
Yardmen, labourers, &c. .	519	17	5				
Salaries	1,958	7	3	Private consumers . . .	6,487	13	9
Directors fees	400	0	0	Public establishments. . .	1,413	4	11
Auditors fees	21	0	0	Meter-rental	524	16	3
Rent, taxes, and insurance .	199	10	8	Products	1,972	5	2
Interest	44	18	3	Transfer fees	3	12	6
Stationery	103	12	5	Profit on fittings	735	7	8
Office expenses	30	19	3	Bad debts recovered . . .	14	9	1
Keep of horses	47	11	11				
Trade charges	168	18	10				
Wear and tear	1,209	16	1				
Repairs and maintenance of public lamps	542	14	7				
Repairs, &c., mains and services	205	19	10				
Bad debts and allowances .	437	7	8				
Exchange (loss)	322	18	1				
Law charges	10	11	8				
Extraordinary disbursements—							
Extension of retort-house, &c.—¼ of £3951 11s. 5d. (4th instalment) . .	658	11	11				
One-sixth of £1078 19s. 6d. (3rd instalment) . . .	179	16	7				
One-sixth of £1274 16s. 3d. (2nd instalment) . . .	212	9	5				
One-sixth of £687 17s. 9d. (1st instalment) . . .	114	12	11				
Balance—profit.	4,615	3	8				
	£20,184	5	5		£20,184	5	5

Profit and Loss Account for the Half Year ending June 30, 1876.

Dividend declared May 16, 1876.	£3,125	0	0	Balance of account to Dec. 31, 1875	£3,576	8	7
Balance	5,066	12	3	Revenue account, net profit for the half year ending June 30	4,615	3	8
	£8,191	12	3		£8,191	12	3
				Balance brought down . .	£5,066	12	3

The CHAIRMAN, in moving the adoption of the report, said he thought he might congratulate the company on having made some progress since the last statement of affairs was laid before the shareholders, inasmuch as the accounts showed considerable economy in working, as well as altogether better results. The savings in the last half year, over the corresponding period of 1875, were £1671, while there were increased receipts to the extent of £477, making a total of upwards of £2000, and leaving a balance to the good of £1178 as the improvement in the working of the half year. The directors looked upon this as a gratifying improvement in the condition of things. Then, to show the progress made, he might mention that, for every £1 spent upon coals in the half year ending June, 1875, the money receipts for gas were £2 11s. 3d., whereas in the last half year they were £2 18s. 3d., being an improvement of 7s. Taking the results per ton of coal carbonized (which was a more satisfactory mode of looking at the matter, inasmuch as they had no control over the cost of coal, while the price of gas per 1000 feet was a fixed amount), he found that, whereas in 1874 the money received per ton of coal was £4 5s., in the last half year it amounted to £5 16s. 11d., being, as he thought they would all agree, a most enormous improvement, and showing that the engineer had worked well for the company. This was also shown by the fact that he had obtained these good results with a much smaller quantity of coals. In 1874 the quantity of coals carbonized amounted to 3656 tons, whereas in the last half year, with a much larger rental, the quantity was only 2897 tons. This spoke well, at all events, for the manufacture. The great blot which appeared at Bahia was the leakage. Probably this was not all waste; possibly some was stealage; but however it arose, it amounted to nearly 30 per cent. He was told that a good deal of it was due to the difficulty of lighting the town, which was

excessively undulating. In addition to this, there was the fact that when the pipes were originally laid down they were much too small. The board were taking measures to remedy this evil. They had forwarded pipes of greater capacity to the amount of £1100, and were now sending out a much larger quantity. The reason for sending them out in this way was that the engineers were not able to deal with more at a time. He (the chairman) had no doubt that when the larger pipes were laid down the improvement would be manifest; and, for himself, he should be dreadfully disappointed if it was not shown in the increased consumption, as well as in the diminished leakage of gas. It must be apparent to every one that where it was necessary, as at present, to employ such enormous pressure, the consumers would not get what they wanted, while the leakage must continue to be great. He hoped, also, that when the larger pipes came into use the company would get rid of that very ugly item in their accounts—the fines that were paid for not lighting the public lamps properly. He was happy to say that these fines had considerably decreased. They were still £239; but even that was a diminution of £104 over the previous half year. Looking at the circumstances of the company altogether, he could not help regarding the statement now laid before the meeting as very satisfactory. Turning to the balance-sheet, it would be perceived that the amount due from the company was £5917, whereas the directors had cash in hand and bills receivable, £5400, being pretty nearly equal to the amount of the liabilities. It would, therefore, be seen that all the money due to them—viz., £11,800—for public lamps, private rental, &c., and the stock in hand, £12,862, were all so much surplus assets over and above what they had to pay; so that whether they paid little or much dividend, they were evidently in a tolerably sound condition, so far as the cash side of the account was concerned. Under these circumstances he had much pleasure in moving the adoption of the report.

Mr. H. Brothers (deputy-chairman) seconded the motion. He said he could endorse very readily the statement made by the chairman, that the engineer at Bahia had done well under the existing state of things, and he believed that when he had all his new plant he would do considerably better.

The Chairman, in answer to an inquiry, said the reason why the receipts for public lamps were last half year only £9272, as compared with £9321 in the previous six months, was not that there had been any falling off in the amount, but that less lighting was required in that season of the year.

Mr. H. P. Stephenson said the amount for the public lamps last half year, as compared with the corresponding period of 1875, was £255 more.

The motion for the adoption of the report was put and carried.

The Chairman moved a resolution declaring the dividends as recommended in the directors report.

Mr. Clements seconded the motion, which was put and carried.

On the motion of Mr. Brothers, seconded by Mr. Thomson, the retiring chairman, Mr. Edward Horner, was re-elected.

On the motion of Mr. Finlay, seconded by Mr. Magnus Ohren, the meeting re-elected Mr. Arthur J. King as a director; and on the motion of Mr. Guyatt, the retiring auditor, Mr. Ohren, was re-elected.

Mr. Clements moved a vote of thanks to the chairman and directors for their great attention to the affairs of the company. In doing so, he expressed his approval of the cautious policy of the board in putting aside a considerable amount to the reserve-fund, but said there was one item in the balance-sheet which he should like to see very much reduced. He referred to the amount of £16,914, under the head of "Preliminary expenses." He hoped some steps would soon be practicable for writing off a portion of that sum.

The vote of thanks having been cordially adopted,

The Chairman acknowledged the same, and in doing so said he was obliged to the mover for the suggestion he had thrown out. The directors had not lost sight of the question of the "Preliminary expenses," which certainly represented a very large sum for a company of this kind. It would be most desirable to get rid of the matter altogether; but so long as the directors were in the position of being required to lay down new and larger pipes, for which they had no capital, it was almost impossible to contemplate a serious reduction of the item.

The proceedings then terminated.

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

(*Concluded from page 705.*)

The President (Mr. Levi Monk), at the evening sitting, read the following paper on

TWENTY-CANDLE GAS AS THE NATIONAL STANDARD ILLUMINATING POWER FOR SCOTLAND.

As it seems to me necessary to review the desirability of endeavouring to get this standard adopted for Scotland, and to invite discussion thereon, I should esteem it a favour if any member will furnish information as to the best burners suitable for lighting, heating, cooking, or trade purposes. My appeal is also to gentlemen in Liverpool, Manchester, Stockport, Huddersfield, London, and other places where 20-candle gas is, or was, the standard; also to manufacturers of gas-burners, and others who have made experiments with gas of such quality for general purposes. If the information should take the form of an elaborate lecture, such as that of Dr. Wallace, on 28-candle gas (see Journal of Gas Lighting, April 28, 1874), and the report of the North British Association of Gas Managers, 1874, or the article in the Journal, Oct. 6, 1874, on "Cooking and Heating by Gas," or as Mr. Pattinson's paper on 15-candle gas (see Journal, March 28 last), so much the more acceptable; but if only brief information can be given, it will be thankfully received, and confer a favour on the advocates of 20-candle gas. Information is especially required to show the best burners to develop the light of such a quality of gas at 5, 10, 15, and 20-10ths pressure, consuming gas to give 5, 10, 15, and 20 standard candles light, each burner tested separately at each pressure, with separate quantities, showing in a tabulated form what is the best burner. Gas managers could then, by merely trying pressure, recommend a suitable burner to use gas with the best results according to the light required. No doubt exists in my mind that the regulators to supply gas at about 8-10ths pressure are the best thing; but we know how few will go to the expense of them. We should, therefore, endeavour to find what is best to recommend consumers after learning the requirements. At present, with the legion of burners in the market, and so many makers claiming that theirs is the best, and with qualities of gas ranging from 18 to 34 candles, one is at a loss what to recommend, and be certain of doing right.

By the "Burghs (Scotland) Gas Supply Act," the standard of 25 candles* is imposed on those who adopt it; but I have yet to learn what information the Legislature obtained to guarantee such a provision of the material as will maintain that standard. So far as I can see and learn, at no distant date we shall have to accept a lower standard, and this is a truth which the Editor of the Journal of Gas Lighting and other writers have endeavoured to force upon the minds of Scotch gas manufacturers. Is it premature to do so? I think not! To a certain extent, the suggestion is being adopted, but united action is necessary to do it openly. The recent position taken up by a private gas examiner at Dumfries (referred to in the "Trade Notes from Scotland" in the Journal of April 18th last) will, no doubt, soon be followed by consumers committees in towns where gas is supplied by the corporations, and in others where no gas examiners, or companies not under statutory obligations, exist. Such frequent reports as appear in the daily papers from the Dumfries gas examiner, will surely cause mistrust of quality, and much discontent among grumblers in other places, as it has done already.

It is not difficult to see that an impetus would thus be given to output of inferior gas-making materials, and also to the gas engineering trade, by an increase of manufacturing and storeage power being rendered necessary to some extent. There would further be a more profitable application of the unproductive plant of many works. In Glasgow, in particular, I find by their last yearly report that beds of seven retorts are being substituted for fives, and successfully, too, so that retort-house room would not be the difficulty it is supposed at some works; while many have tank and gasholder accommodation not likely to be required for many years to come, while supplying the present quality of gas. The reduction of quality would hasten the reconstruction of some works, and the entire removal of others that have been too long where they are. It would also induce a greater application of gas to cooking, heating, and other trade purposes, and, consequently, promote the day trade of the companies. There would also be less frequent complaints of soot, smoke, &c., in connexion with Scotch gas supply. Further, we should be relieved from comparisons of the prices in Scotland with those of English towns, apart from the question of quality; for I am persuaded there is no difficulty in supplying 20-candle gas in Scotland as cheap as 12 to 15 candle in England. The reduction of illuminating power would be beneficial to consumers also, and to all concerned, I consider (for the reduced quality would be more than proportionately reduced in price), unless it be the owners of first-class cannel coals, and it is even questionable whether it would affect them, as their trade is almost entirely export.

The enormous prices of good cannel three years ago will, no doubt, return. The great annual export and consumption, with the high price now maintained—50 per cent. advance on the prices of 1864—although the gas coal trade is so depressed, compared with inferior gas-making materials, shows most unmistakeably that the ever-growing demand and the diminishing supply ensure an increased price to the cannel coal-owners to meet the export trade. Hence my appeal to those who are in a position to give the desired information, as it is equally their work and interest as it is ours, who are supplying over 20-candle gas.

And now, what evidence have we in favour of the reduction of the illuminating power? In 1867 I find Mr. G. R. Hislop read a paper on "Substitutes for Cannel Coal to be Used in the Manufacture of Illuminating Gas," before the North British Association (see their "Report," 1867, and the Journal, August, 1867.) He says: "It is an alarming fact that within two years our cannel coals have been increased in price to the extent of from 40 to 50 per cent., thereby rendering a general increase in the price of gas throughout Scotland an absolute necessity. The cause of this enormous advance is not far to seek. It must be attributed directly and mainly to the mighty draining system of exportation carried on by our foreign neighbours, and to the ever-increasing demands of English gas companies. Should the bill now before Parliament be carried through, to compel the London gas companies to raise the illuminating power of their gas, matters will be made worse. There are constantly being erected, also, large works in various parts of Europe, requiring liberal supplies of our coal, thus annually increasing their consumption to such an extent that, if continued, our resources, which are somewhat limited, must soon be exhausted."

In July, 1873, in his "Inaugural Address" to the North British Association, at Edinburgh, Mr. M'Crae says (see their "Report," 1873, and Journal, July 15, 1873, p. 640): "Consumers of gas are quite aware that gas cannot be produced at so low a price as formerly, nor is gas likely to be so cheap as it was a year or two ago, for a very long time to come; or, if it is as low in price, the illuminating power of the gas will require to be much reduced; indeed, my opinion is that the gas consumers of Scotland must make up their minds to be satisfied with gas much inferior in quality to that which they have hitherto enjoyed. Why we Scotchmen should desire and get so much richer gas than our English friends is more than I can see."

Mr. Foulis also says, to the same Association, in a similar address, the year following (see their "Report," 1874, and Journal, July 28, 1874, p. 126): "The two years, which have just passed have been years of no small difficulty to all concerned in the manufacture of gas. The extraordinary high price of coal has rendered it very difficult indeed to make both ends meet, even with the increased price, in nearly all cases, it has been found necessary to charge for gas. I am glad, indeed, to think that we have seen the worst of it. Cannel has fallen at least from 5s. to 7s. per ton, as compared with last year's prices, and there is every reason to believe that prices will fall still lower, although I think we can scarcely expect that they will this year fall to the low rates at which we could purchase coal two years ago. First-class cannels are not, in my opinion, likely to come so low, as the seams are limited, and are gradually getting worked out. Shale has been tried by many of us as a substitute for the higher class of cannels, for increasing the illuminating power of the gas; but, so far as my experience goes, with only partial success, the expense of removing the refuse, especially in large towns, being a considerable drawback, and the small quantity of gas yielded from a ton reducing the manufacturing power of the works. It has been frequently stated of late that, as the richer cannels get worked out, the quality of the gas must be reduced, and I believe that ultimately it will become necessary to lower the standard of illuminating power given in all towns in Scotland; but this cannot be done without considerable difficulty. If you use a gas of lower illuminating power, you must use an increased quantity to produce the same amount of light; and we all know that the fittings in nearly all houses in Scotland are small even for the supply of the quantity of gas necessary when cannel gas is used, and they would be quite inadequate were an inferior quality supplied. At the same time there can be no doubt, if gas were properly consumed, an equal amount of light might be got from gas of an inferior quality, as is now given by the generally imperfect methods of consuming it. Before this can be done, however, consumers would require to be educated up to it. In a paper read recently by Dr. Wallace, and published in the Journal of Gas Lighting, there is the following remark: 'I have said that the quality of the Glasgow gas is guaranteed to be 25 candles, and is in practice from 26 to 28—that is, as tested by the burner, and in the manner described in the Glasgow Gas Act, 1869. But when consumed in smaller burners, and at higher pressure, the result is exceedingly different, and I have reason to believe that the average illuminating power does not exceed 16 candles. We have here a loss of light that might be obtained by burners of proper construction and favourable circumstances, as regards pressure, to the extent of about 40 per cent.; and if we calculate this upon the whole quantity of gas consumed in Glasgow, we find it to represent a money value, at 5s. per 1000 cubic feet, of about £130,000 per annum.' In that paper he shows that in Glasgow, with 106,000 meters, and gas at 4s. per 1000 feet, the total gas revenue was £252,000; while in Birmingham, with only 50,000 meters, and gas at 2s. 3d. and 2s. 7d., the rental was £236,000. From this it would seem that if the same quality of gas was supplied in Glasgow and sold at 2s. 3d. instead of 4s., it would cost the inhabitants £250,000 per annum more than they now pay for the same amount of light. I do not know of any subject more important or more deserving of the consideration of gas managers than the proper means of consuming gas of the qualities we are accustomed to deal with. We all know how much time and money has been spent by Government Commissioners, and by private parties, to get at the burner which will give the greatest amount of light from a given amount of common gas. We know how successful these efforts have been, but almost nothing has been done in this direction with regard to gas having an illuminating power above 20 candles. The principle on which the burners of Mr. Sugg and others are constructed, and from which such admirable results have been obtained, is that the gas

* The author appears to be under a misapprehension. By the 57th section of the Act it is provided that "all the gas shall give a light equal in intensity to the light produced by 14 sperm candles," &c.—Ed. J. G. L.

should issue from the burner without pressure. The difficulty of doing this with the richer gases is the great tendency of the gas to smoke. With the fishtail or union jet burners, a certain amount of pressure is necessary in order to spread the flame, so as to give perfect combustion. In the testing-room, with a perfectly still atmosphere, gas may be burned from a union jet or bat's-wing at a pressure as low as 3-10ths, or even 2-10ths, but in ordinary rooms it is impossible to use pressure so low as this, as the slightest current of air causes the flame to smoke, producing blackened ceilings and unpleasant smells. I do not think we, as gas managers, should rest contented until we are able to place within the reach of every consumer the means of obtaining the full amount of light from every cubic foot of gas consumed. It is a subject well worthy the consideration of every one of us, and I would recommend a very careful study of the paper above referred to by Dr. Wallace, in which will be found much valuable information. I think we ought to look at this as a benefit to the manufacturers, as well as to the consumers. We all know there are great fields of cannel in Scotland, which yield from 22 to 24 candle gas, and also that many splint coals in such abundance, worked in conjunction with gas coal seams, yield from 18 to 22 candle gas, and that it is only where we get above these qualities that the great expense is incurred. If, therefore, we could introduce means by which the consumers would be able to get the same amount of light from a given quality of, say, 22-candle gas, as they now get from 26 or 27 candle gas, the introduction of the gas of lower illuminating power would be simply effected, and gas might be sold from 20 to 30 per cent. cheaper, with as profitable a result, and the increasing difficulty and expense of getting the high-class cannels would be overcome."

In Dr. Wallace's paper he says: "With regard to the prospects of an early reduction in the price of gas, I must ask you to allow me to make a short quotation from a recent number of the JOURNAL OF GAS LIGHTING (Feb. 10, 1874, p. 177), where, in discussing this subject, the Editor makes the following remarks:—'In Scotland, the effects of the rise in the price of cannel are much more apparent. The names of 222 undertakings appear on our list, and it will be seen that of these, 66, or nearly one-third, raised the price of gas in the course of last year. We must remark here again, that the advances were numerous in Scotland in the previous year, and thus the advances in Scotland are greater in number than in England and Wales. No considerable fall, if any, in the cost of cannel coal is to be expected, and the Scottish companies will inevitably, sooner or later, have to consider whether or not it will be possible to continue an exclusively cannel supply. In the meantime, they are unquestionably promoting the rapid exhaustion of a material limited in quantity, and which, so far as we can see, cannot be replaced; which is highly valuable as an auxiliary, but the exclusive use of which is undeniably wasteful.' Further on the same writer states that, in England and Wales, advances in the price of gas are most numerous in coal districts. This apparent anomaly is easily explained by the simple fact that, in districts far removed from the coal-fields, coke increases in value in a much higher ratio than it does in the coal-producing districts. And again, as regards the Scottish gas-works, the coke produced from cannel coal is very inferior in quality as compared with that made from English caking coals, and the increase in the price of the coal is trifling, and does little to compensate for the rise in the value of the coal." Further on he says: "I admit freely, and at once, that it is impracticable (not to say impossible) to obtain, in the every-day practice of common life, results as good as those got by means of appliances the most perfect for developing the full photogenic value of the gas; but still a very great deal might be done to decrease the reckless waste of light that is constantly going on. I have no hesitation in stating that, without difficulty, from 20 to 23 candle power might be obtained in every-day life from 26-candle gas." (For Dr. Wallace's paper, see "North British Report," 1874, and JOURNAL, April 28, 1874.)

Again (see "North British Report," 1875), Mr. G. R. Hislop, addressing the Association at Dundee, says: "It is beyond all doubt that Scottish gas companies will find relief only when a lower standard of illuminating power—say from 20 to 22 candles, instead of from 26 to 30 candles—has been proposed to, and accepted by, the gas-consuming public; and I have no doubt that, with properly adapted means of combustion, it would prove to the advantage and satisfaction of all. Proportionately, such gas could be supplied very much cheaper, inasmuch as it would enable us to draw our supplies more largely from the abundant third-class cannel, and also enable us to utilize more extensively the many excellent splint coals with which the country abounds. The force of circumstances will undoubtedly, ere long, bring such a change about."

The Editor of the JOURNAL OF GAS LIGHTING (March 28 last, p. 454) writes a paragraph as follows: —"We have often to call attention to the injustice which the so-called leaders of public opinion do to gas companies, by their ignorant and rancorous criticisms. It is, however, not only companies who suffer. This is what we read in a leading article in a Glasgow daily paper: 'The commissioners supply us with *little light and a great deal of soot*, for which they charge us 4s. 7d. per 1000 feet, probably about 1s. 7d. for the light, and 3s. for *the dirty smoke*.' . . . The fact is, that Glasgow gas is fairly uniform in quality at the standard of 25 candles. The fault is, that the gas is too rich, and that it is difficult to get burners which will properly consume it. If the Glasgow Corporation were wise, they would seek power to reduce the standard of illuminating power, and necessarily of price. They might not then be charged with supplying 'dirty smoke' at 3s. per 1000 feet."

Again. Mr. M'Crae says, later still, in a lecture at Dundee on "Gas Economy." "The loss in Dundee by imperfect combustion may be stated at £15,000 per annum. The subject is very important from another standpoint. I have referred to-night to the deposits of rich cannel coal, with which Scotland, above all other parts of the kingdom, has been favoured. These deposits of high-class coals are nearly exhausted; whereby the day is not far distant when the people of Scotland, more especially in large towns, will be compelled to use 18 or 20 candle gas. They will then learn how to use such gas to obtain sufficient light. Personally, I do not fear the consequences of being subjected to the use of 18 or 20 candle gas, being quite certain that, with proper care, a better and much cheaper light will be enjoyed from gas of that quality than what, as a rule, is got at present. In the face of these simple facts, I think all will admit there is great need for more care and attention to the proper use of gas. I think it will also be admitted that it is great folly in any community to wilfully waste so much money as is presently being done by increasing the first cost of the gas by making it so rich, and making such abuse of it by wasting it at the burner. Let us suppose that there is a town supplied with what is termed 30-candle gas theoretically, the consumers of such gas use No. 1 and No. 2, or even No. 3 burners. They are not getting over two-thirds of the light contained in the gas. Let us suppose another town supplied with 20-candle gas, and this gas being much more easily made available than the other, they get about the full theoretical light at the ordinary burners. All else being equal, the consumers of the rich gas would require to pay from 1s. 6d. to 2s. more per 1000 feet than would be required in the town supplied with 20-candle gas, and from what we have seen to-night, the one town would be as well lighted as the other. It may be said, improve the burners and all else necessary to utilize the rich gas. This, you will have observed, we are unable to do. The richer the gas is, the greater the difficulty (in practice) in getting the theoretical illuminating power. Every community has a right to get clean gas, and where it is not clean, they ought to demand that it shall be so; but no community should allow its money to be spent in making gas of such high quality that it cannot be used without great loss."

And yet again, Dr. Stevenson Macadam's lecture on "Combustion of Coal Gas," at the North British Association meeting, in Edinburgh, last July, showed us that well-made and well-purified coal gas, if properly burned, exerts but an infinitesimally small deteriorating influence upon the surrounding atmosphere of an apartment in which such gas is used. Will, then, the reduction of, say 28 or 25 candle gas to 20-candle gas, make such a difference? I think not. And again, will there not be more value proportionately from residual products by using inferior coals? I think so; and I have heard the same opinion expressed by gas managers in large practice. If I recollect right, in the western district of London there has been a reduction of the illuminating power from 20 to 16 candles; and at Dublin also, as cannel was so expensive, and there was so little profit by raising the standard. I may add, too, that several companies are using shale to great advantage, in moderate proportions, where carriage is not heavy, and they can get rid of rubbish at a cheap rate, otherwise they could not supply the quality they are doing, at the price. And as for splint coals containing half parrot, great quantities are being sold for household use, and fuel for various purposes, because there is not sufficient sale for gas-making.

And is the greatest objection urged, that the poorer quality would require larger mains, gas-fittings, and meters, in proportion to quantity passed through them, worth consideration? Is not the lighter specific gravity of the gas being lost sight of, if lower illuminating power is used? I think so. I believe that there is not such a difficulty as is supposed, and that the smallest size of meters is sufficient for two or three lights where, generally, one is now used, while the larger sizes could be gradually changed to lower positions, according to requirements. And, in illustration of my opinion, that the lighter specific gravity of poorer gas would travel so much easier through the mains, I may mention that, in the peculiar position I am, supplying from two works, and having two-thirds of my storeage a mile away, I often notice in winter, when we are using all good cannel coals, to keep up our quantity and quality, that gas will not travel to the other holder fast enough, by reason of its greater specific gravity, and that the gasholder blows at the manufacturing works, even though we increase the pressure; but as soon as we put in a charge of light parrot or splint coals, giving about 20 to 22 candle gas, away goes the gas to the other holder quite freely. I have looked up some authorities, and find that

12-candle gas	is about	·420	specific gravity.
20	"	·520	"
28	"	·650	"
37	"	·752	"

The companies farthest away from the coal-fields would benefit most, in my opinion, by a reduction of quality—by having a less fuel account, and so much more for sale of coke where there is generally good price for it. We ourselves, too, in the more favoured districts, would find a readier sale, and would obtain so much more for our tar and ammoniacal liquor.

And now what evidence have we against the reduction of illuminating power? Dr. Wallace says ("North British Report," 1874, and JOURNAL, April 28, 1874, p. 584): "But it cannot be doubted that a supply of gas of comparatively high illuminating power is a most desirable thing, independent altogether of the consideration of cost. Cannel gas gives only a little more carbonic acid and other products of combustion than common gas, while it yields, in ordinary practice, twice as much light. In other words, if we wish in an apartment a certain amount of light, we must vitiate the air to nearly double the extent if we employ common gas, such as that used in Birmingham and London (12 to 16 candle) that we require to do with Glasgow or other (22 to 28 candle) cannel gas, with a corresponding increase of temperature. As regards sulphur, it is even worse; for in common gas the average is about 30 grains per 100 cubic feet, while with our gas it certainly does not exceed 15 grains; so that, for equal quantities of light, about four times as much sulphurous acid is produced in burning common gas as compared with cannel gas. This is a very serious evil, and accounts, to a large extent, for the comparatively limited use of gas in the better class of houses in London and other English towns. Then, again, all our fittings are adapted for cannel gas, and are often deficient for it, and a change to gas made from common coal would necessitate a complete revolution in gas-fitting arrangements. I think you will agree with me, therefore, that we should retain our cannel gas as long as we can; and my own impression is, that by a judicious use of a mixture of splint or caking coal with oil shales, together with a limited use of cannel coal, a supply of gas of 25 to 28 candles may be kept up for very many years. Many of our splint coals give gas of 18 to 20 candles, while the shales used in the manufacture of oil give gas of 30 to 45 candles. The oil trade is at present much restricted, and shale of good quality may be obtained in any quantity at a moderate price. The coke of oil shale is almost worthless, but, on the other hand, that of splint coal is very superior to that made from ordinary cannel coal."

Mr. Stewart, in his address to the North British Association, at Edinburgh, says (see "Report," and JOURNAL of Aug. 1, 1876): "There is also another question which is receiving a good deal of attention just now, and that is the quality of the gas. To remove the cry of dear gas, some are proposing to make a reduction in the price by reducing the quality, and suggest the use of improved burners, by which 22-candle gas can be made to give the same results as 28-candle gas; but I do not think the object is likely to be soon obtained, for, supposing every one to be supplied with suitable burners, it is hardly possible that they would be kept, or would continue in that efficient condition necessary for perfect consumption. And again, it appears to me that if it is possible to supply such burners, and keep them in a perfect condition, it is just as easy to supply burners that will make 28-candle gas give the same results as 34-candle gas; and I think there cannot be a doubt that the consumers would be much better served in the latter case than in the former. The mode by which cheaper gas of the lower quality is to be supplied is, I understand, by the use of second-class cannel and splint coals, the better price got for the coke, and saving of expense of first-class coals going to cheapen the cost of manufacture; but it is very evident that, if these coals were used in quantities which would then be necessary, they would be increased in price until they equalled any increased value got for the coke, and saving of expense of first-class coals. It is, therefore, very doubtful if any saving would be made in the cost of manufacture, such as would permit of any great reduction in the price of the low-quality gas; but supposing such saving could be made, and the plan adopted, it is plain that it would not do for towns here and there to take up the principle, but it must be done generally all over the country at the same time; otherwise, however cheap the gas by which the public in low-quality towns were supplied, the consumers would insist upon having the better quality that their neighbours were getting, no matter what the difference in price between the places." I am sure Mr. Stewart speaks the mind of most of us on the subject; but you see he is also for and against, and I take Dr. Wallace's arguments in the same light.

I do not think the argument holds good that inferior coals would rise in price in the same ratio as good cannel coals; for the fact is probably overlooked, that, whereas the supply of the former is unlimited, so to speak, the latter is well known to be diminishing rapidly. We must all be agreed, as Mr. Stewart says, and not towns here and there (as at present), but all over the country must agree to reduce the illuminating power, for the reasons he states.

I think I have now said sufficient on the matter to open up the subject for consideration and discussion, and to encourage some one to put it in a better form in a paper for our next meeting.

AMERICAN GASLIGHT ASSOCIATION.

The Fourth Annual Meeting of the Members of this Association was held in Chickering Hall, New York, on Wednesday, the 18th, and Thursday, the 19th, of October—the PRESIDENT (General Charles Roome) in the chair.

We extract from the *American Gaslight Journal*, which has been designated the official organ of the Association, the following report of the proceedings.

The transaction of some routine business and the election of new members occupied some time at the opening of the first sitting.

The PRESIDENT delivered the following

INAUGURAL ADDRESS.

Gentlemen,—Again it is our privilege to meet in annual communication to compare notes on the occurrences of the past year, and to deliberate on matters pertaining to the important industry with which we are connected. In common with our fellow-citizens engaged in other pursuits, we have felt the depressing influences which have affected the course of trade and manufactures throughout the country, and, indeed, the world; and yet to-day, I trust with them, we feel also the encouragement arising from the evidence of renewed activity and confidence which is beginning to make itself felt.

Whatever of improvement in apparatus, or in the process of manufacture has taken place, is doubtless familiar to most of you from the columns of the *American Gaslight Journal*, which is so ably conducted by the distinguished engineer who has the editorial charge of that most valuable periodical. To sustain it, and to contribute to its usefulness among ourselves, should be the effort of us all. I am one of those who do not believe in sudden startling developments in our profession. With us everything must, of necessity, be reduced to a mathematical demonstration. The laws of chemistry and of engineering are exact and clearly defined. Patient investigation, careful investigation, numberless experiments, close observation, and calm deliberate thought, are required of us. Nothing should be taken for granted until clearly and unmistakably proved. Step by step we advance as experience and severe study guide our investigations. To jump at conclusions in a business like ours is sure to produce loss and disappointment. In the course of a long experience, extending over something more than 40 years, I have witnessed many so-called wonderful discoveries, which at the time appeared, to those not regularly brought up in the business, as certain to revolutionize the entire process of gas-making, and I have seen these wild schemes topple down one after another, carrying in their train bankruptcy and ruin to the credulous dupes of the ignorant or the designing. So plausible are the specious arguments of these adventurers, who generally commence by deceiving themselves, and finding among men of means willing listeners anxious to acquire suddenly still greater wealth, it can scarcely be wondered at that so many abortive efforts have been made to obtain results which common sense and an intelligent knowledge of the business of gas-making would have served to show were simply and utterly impracticable. The wild ideas which so generally prevail of the enormous profits of the companies already established, and the claims set up by these pretenders to scientific knowledge, do, and probably will continue to find encouragement among those who are willing to take for granted what is so boldly asserted, without troubling themselves to ascertain, by careful inquiry, whether or not there is or can be any reasonable grounds of success. Let those who are regularly engaged in the legitimate business of gas-making avail themselves of every opportunity of acquiring knowledge, and adopt such improvements as the judgment and experience of their associates approve. Thus we will continue to progress, and thus we will avoid those disasters which a different course of procedure will certainly entail upon us. It is for this purpose we have established this Association, that each may avail himself of the experience of others; that no one need to grope his way single-handed and alone, but that each member may ever have the beacon of experience, not of one, but of many, to guide him in the conduct of his responsible and arduous duties.

Let us calmly consider whatever is presented here calculated to promote the general welfare. Let us examine, without prejudice, the plans and recommendations submitted for our deliberation, and, by our mutual counsel, endeavour to obtain the most reasonable solution of the problems we may be called upon to discuss. While such is our object and aim, this institution must prosper, greatly to the advantage of the profession of which we are justly proud, and prove beneficial to all who are in any way affected by our actions.

It may not be inappropriate that I should refer to something of my own experience in the business to which we are devoted. Would that I might make an adequate record of the noble men who stood as the advance guard in our profession at the time I joined it. As 40 years have rolled along, those honoured names have, one by one, passed into history; and though they have gone from us, still they live in their influence, their example, their honesty, and their high scientific attainment. In England there were Clegg, Thompson, Lowe, King, and Barlow; while in our own land we had Torrey, Ellet, Cresson, Campbell, Darricott, and Merrick.

Upon us have fallen the honour and responsibility of taking up the work where they left it, and carrying forward to their full fruition the many improvements the inception of which may be traced to their study and labours. Let us not look lightly upon the responsibility of our position, but make it our constant study to see that nothing occurs to dim the lustre which their names have left upon our honourable profession.

When my connexion with the business began, there were, I believe, but four or five gas companies in this country; one in Baltimore, one in Philadelphia, one in Boston, and two in this city, and, I think, one in New Orleans. Private attempts were made to light individual buildings, but with indifferent success. One of these was in the New York State Prison. I have heard my mother say that if I did not succeed in making better and purer gas than the chemists made in those days, it would be well for me to choose some other calling; but we have learned better since, and sulphuretted hydrogen is now so easily removed, that there no longer exists any trouble on that account. When I first became engineer of the Manhattan Gaslight Company there were not a dozen private dwellings lighted with gas in this city; there were very few gas street lamps above Grand Street, and they were mostly confined to Broadway and the Bowery. The prejudice against the use of gaslight was very great. It was believed to be dangerous, injurious to furniture, and altogether too trying for the complexion of the fair sex. I was once severely censured by my directors for laying gas-mains in Union Square, and in the streets around Gramarcy Park, and one of them sold his stock because he saw nothing but ruin for a company who tolerated the extravagant ideas of an engineer who laid pipes as far north as Twenty-Ninth Street.

In those days there were no dry meters. Mr. Bogardus, of this city, who was the inventor of the dry meter, obtained a patent here, but failed to get one in England. I believe he made nothing by his invention. His meter was defective only in this—that the diaphragm which was, I think, of *oiled silk*, was not sufficiently steady in its action. Defries improved on this by using leather, and fastening to the leather tin plates, in a manner now familiar to you all. When the World's Fair was held in this city in 1853, Mr. Bogardus saw there a dry meter, which was on exhibition, made by the late Mr. Samuel Down. He called to see me on the following day, and was surprised to learn that it was extensively used in England, and was likely to be generally adopted in this country. He tried to get a renewal of his patent, for which Mr. Down offered to pay him a large sum, but it was too late, and Mr. Bogardus shared the fate of many other inventors, witnessing the accumulating wealth of those who knew how to adapt what they were incapable of inventing.

There were no clay retorts used in American gas-works until I introduced them from Belgium. Even our iron retorts were imported from England, and in fact, all our apparatus came from there.

The Boston Company used wooden tanks for their holders, and the companies in this city had cast-iron tanks placed above ground which, together with the holders, were imported. I cannot tell when the other cities began to manufacture the apparatus required by gas companies, but I know that my company never purchased any here until I took charge of the works in 1841. Our business was small at that time. We were making less than 50,000 cubic feet of gas per day, and there was little confidence felt by our stockholders in their investment. How vast the change since then. From a mere article of luxury, or at best convenience, gaslight has become a matter of prime necessity. There is not a dwelling in the country, where it can be had, which does not use it in preference to any other means of illumination. Then it was confined to stores and workshops. By degrees it found its way into places of public amusement, into churches and other large buildings; but it had a hard struggle before it secured a permanent location in the library and the drawing-room. As men of education engaged as engineers and chemists in the study, and devoted their talents and their energies to the discovery of new methods of manufacture and purification, step by step this new light forced itself upon the favourable consideration of the public, and the manufacture and distribution of illuminating gas became a matter of pure science, and so it stands to-day. We, whose privilege it is to follow in the steps of the distinguished men whose names I have mentioned, and who were in constant communication with others equally distinguished, but with whom I had not the honour of being personally acquainted, must realize how great is the responsibility which rests upon us. We may not, we must not, stand still. It would be a disgrace to us and to our country if we did so. We must prove that we appreciate highly, as we ought to appreciate, the dignity of our profession, and we must by individual and united effort move forward in the path we have chosen, and show ourselves worthy of the mission which has been entrusted to us.

Avoiding, then, all countenance of the charletans who will from time to time arise, endeavouring to force their pretended discoveries upon those whose fears as stockholders are easily excited, let us pursue the even tenor of our way, working steadily and intelligibly in accordance with those laws which nature and pure science have fixed as unalterable. Here a little, there a little, permanent progress will be made. If we are wise we will be content with this, and not let every idle notion which presents itself disturb our equanimity or our faith in principles which are firmly established.

Far be it from me to discourage any improvement. The most valuable ideas, are sometimes obtained from the humblest workman, whose means of observation may be greater than those of the engineer in charge. Encourage by all means this habit of observation, and give full credit to those who deserve it, but reserve your own judgment, and do not seek to have adopted the ill-digested notions of those who are incompetent to judge between truth and error. I would say to the young engineer, if you are desirous of becoming eminent in your profession, you must study and study hard—you cannot become master of your business in one year or in ten years. You must read something more than "Clegg's Treatise," or "Ure's Dictionary." You must not only read but you must carefully study the scientific journals of the day. You must converse with those who are older than yourself, and who will cheerfully give you the benefit of their experience. Of all the professions in this world, I know of none more honourable than that of the engineer, and of no class of men more liberal in their views or more willing to aid and encourage the young. Then live up to your profession and be an honour to it, for every advance you make is for the benefit of mankind.

Until within a few years very little effort was made in this country to utilize the secondary products of the retort-house. The coal tar and the ammoniacal liquor were permitted to run to waste. Now, however, the case is different, and we have reason to hope that these valuable articles will become, before long, sources of profit to the producers and the manufacturers.

Much might be written on the changes that have taken place in the apparatus used by the gas companies here during the past forty years; the old-fashioned box washer giving way to the jet, the jet to the scrubber, and the scrubber itself modified from time to time, as experience suggested. The purification by lime and by oxide of iron, and the controversies growing out of the use of one or the other—the substitution of clay retorts for iron, and the earnest arguments advanced by the advocates of each—all these have passed into history, but it is none the less interesting to look back and reflect upon the steady progress made as experiments after experiments were published, and discussion after discussion, through the columns of the scientific journals, were had between the very able engineers and chemists of England and Scotland. There is no reason to doubt that we shall continue to advance from year to year. Differences of opinion will exist, and we shall all get the benefit to be derived from fair, candid, courteous discussion. Both here and in the journals, and in the reports of kindred associations, we are to look for information on all matters connected with our calling, the nature of which, though at times full of anxiety, and always of great responsibility, is still so fascinating to the intelligent student of science, as to reward with success the faithful and conscientious seeker after truth.

I have thus glanced as briefly as I could at some of the important changes that have taken place in my day, and within my own observation. All the distinguished engineers whose names I have mentioned, and with some of whom I was on intimate terms, and to whom I was warmly attached, have gone before me to the regions of perpetual day. In a few brief years I must take my place also as one of the departed, and I ask no greater honour in this world than to have my own name recorded as worthy to be inscribed on the same page with theirs.

Thanking you for your patient attention, I respectfully submit the business of this Association to your careful deliberation.

At the close of the President's Address, a report was brought up from the Executive Committee, containing several suggestions for the future guidance of the Association, which, after some conversation thereon, were adopted.

A letter was read from M. Durand, the editor of *Le Gaz*, offering his congratulations to the Association, and requesting acceptance of several works prepared by him.

A resolution was passed electing M. Durand an honorary member of the Association.

[The report of the subsequent proceedings at the meeting will be continued in our next number.]

THE GAS EXAMINER AT FENTON.—At the meeting of the Fenton Local Board, on the 7th inst., a member, Mr. Stubbs, said he had given notice of a motion to the effect that the office of gas examiner be dispensed with. He considered that the gas company ought to supply them with good gas without it being necessary for the board to employ an inspector. The board, however, he found, had contributed £40 towards the provision of the gas-testing apparatus; and as there was no probability of them getting the money back, he would withdraw the motion.

SUTTON-IN-ASHFIELD GAS SUPPLY.—A special meeting of the local board of this district was held on the 14th inst., when it was unanimously resolved—"That in the opinion of this meeting it is desirable and expedient that the local board should purchase the gas-works and undertaking of the Sutton-in-Ashfield Gas-Works Company, and it is hereby resolved that efforts should be at once made with a view to such purchase, and that a committee of the local board be appointed, with full power to enter into such agreement for the purchase of such undertaking as they may deem just and proper."

GOLDSMITH'S IMPROVEMENTS IN GAS-METERS.

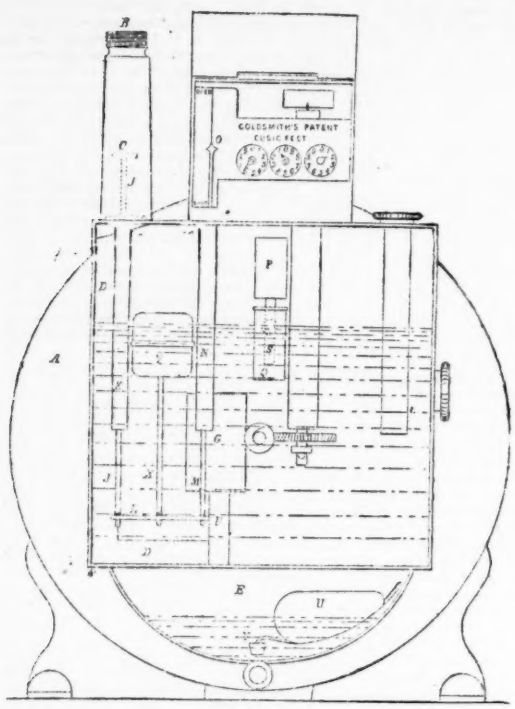


FIG. 1.

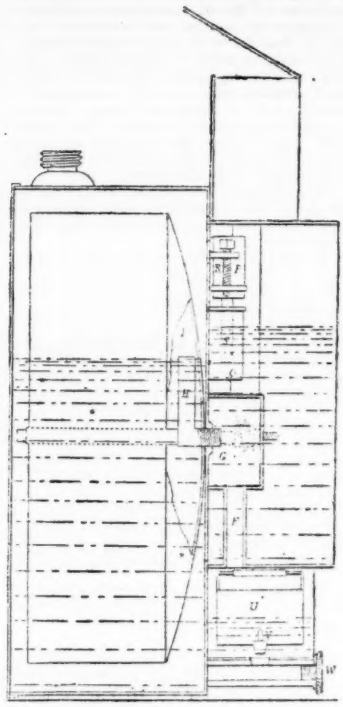


FIG. 2.

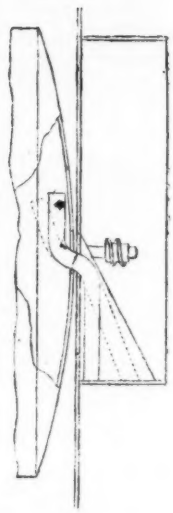


FIG. 3.

Our "Register of New Patents," on the 17th of September last, contained an abstract of a specification of a patent (No. 2639, 1875) taken out by Mr. G. Goldsmith, of Leicester, for "Improvements in gas-meters," and we promised a fuller description of the apparatus in a future number.

In the annexed drawing, fig. 1 represents an elevation of the meter, with the front of the reservoir, or float-chamber, and waste-water box removed; fig. 2 is a vertical section of fig. 1; and fig. 3 is part of a vertical section, showing a modification as to the manner in which the spout may be adjusted.

In fig. 1, A is the case; B, the inlet; C, the valve dotted in; D, the inlet-tube; E, the waste-water box; F is the tube or conduit for conveying gas to the box, G, into which the spout, H, is screwed—the screwing it to the right or left having the effect of raising or lowering it to its proper position; and I is the cover. Attached to the valve, C, is a rod, J, which passes down the sealed tube, K, and is fixed to the arm, L. To the other end of this arm is another rod, M, which ascends through the sealed tube, N, and terminates in a pointer, O, placed in front of the dial-face of the index; and by its position between the points, marked "open" and "shut," indicates whether the meter requires replenishing with water or not. Fastened to the arm, L, between the rods, J and M, is another rod, X, to the top of which is fixed the float, Y.

For the purpose of adjusting the water-line in fountain meters, a tube, P, is provided, the lower part of which, S, is of smaller diameter, so as to enter through a stuffing-box into the little box or chamber, Q, where the lower part of the small pipe is ordinarily sealed with the liquid in the meter. In the upper part of this small box or chamber is a hole which communicates with the drum-chamber. When the lower part of the small tube becomes unsealed through loss of water, by evaporation or otherwise, the gas from the drum-chamber enters by the hole before mentioned, and passes into the upper part of the front chamber, when water will flow from the reservoir into the drum-chamber until the small tube is again sealed. R is a screw, furnished with a square head, so as to be turned by a key inserted through the bottom of the index-box, and is used to adjust the small pipe, S, before referred to. The waste-water box, E, is provided with a hinged float, U, and valve, V, which opens or closes the way to the run-off or waste-water plug, W.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The great uncertainty which still exists as to what may be the result of the pending negotiations on the Eastern Question has a very bad effect on many departments of the iron trade, as well as on the hardware industries, inasmuch as it totally prevents all speculation, and has a deterrent effect in respect of legitimate business. The outbreak of war would necessarily have the effect of causing a great increase in freights, and might cause a scarcity of merchant bottoms, both of which results would have a direct tendency to immediately limit foreign trading. As it is, no one is buying more than he absolutely requires for present uses, except, perhaps, some few purchasers of raw materials, and these cannot very well become much cheaper than they are. Pig irons remain fairly steady, but the firmness of the Scotch market in regard to makers brands has not as yet had the effect of causing any increase here. North Yorkshire pig iron is quoted at about the following figures, for net cash:—No. 1 foundry, 50s. 6d.; No. 2 foundry, 48s. 6d.; No. 3 foundry, 47s.; No. 4 foundry, 45s.; No. 4 forge, grey, 44s. 6d.; No. 5 forge, mottled, 44s.; No. 6 forge, white, 43s.; refined metal, 66s., Kentledge, 51s.; and cinder pig, 40s. per ton. Millom "Hematite" Bessemer, No. 1, is 72s. 6d.; No. 2, 70s.; and No. 3, 67s. 6d.; whilst some makers ordinary No. 3 is 67s. 6d.; No. 4, 67s. 6d.; and No. 5, 67s. 6d.; with 2½ per cent. discount off for prompt cash. Derbyshire pig ranges from 54s. to 57s. 6d. per ton. At Thorncliffe and some other leading establishments the furnaces are producing a fair tonnage, much of the total quantity being used up at the producers works or in the locality. Merchant qualities, as I have stated on previous occasions, are neglected, the price obtainable for common bars leaving no profit whatever.

In the coal market everything tends to demonstrate that the output is even now in excess of the demand, and that it is most likely to remain so unless the winter prove unusually severe and protracted. The coal merchants state that they can make no profit, and many of the colliery owners aver they are in a very little better position. The London market is choked up with household and manufacturing coals, not fewer than 900 laden waggons standing one day last week in the Great Northern yard at Holloway. The closing of the Baltic has had the effect of limiting steam coal shipments, but on home and other foreign accounts it is selling fairly well at 8s. to 10s. per ton. Local coke is very weak in price. One firm alone has 170 waggons here awaiting customers, and I learn that 14s. per ton, or even lower, may be accepted by the agents, in order to get the trucks at liberty.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The market in this district, so far as all classes of round coal are concerned, continues very steady, and in the best sorts, such as Arley, Orrell, and King coal, there is a stiffening tendency, owing to the raisers of these classes of coal being generally very full of orders. There is, however, no quotable alteration in prices; and for the second qualities, such as Pemberton four-feet and the Wigan mines, it is difficult to obtain any advance upon last month's rates, as the supplies of this description of fuel are generally plentiful, and could be readily increased if necessary, to meet any extra demand that might arise. Gas-making coals remain without any material change, and as there is little or no buying just now, quotations cannot be given, although for any fresh orders that might be offered there is no doubt that sellers would be firm. In other descriptions of fuel the market continues weak; although there has been a little better demand for common coal, owing to many of the forges being now fairly employed, this class of fuel is still a drug, and low in price. Burgy is generally plentiful, and the advanced prices in the Manchester district are difficult to obtain. Supplies of slack continue very much in excess of the demand, and there are now large quantities being pushed on the market at extremely low prices. The average list quotations at the pit mouth in the Wigan district may be given about as under, although for Oaks in bulk, there is no doubt, lower prices would in many cases be accepted:—Best Arley, 11s. to 12s. per ton; Pemberton four-feet, 9s. to 9s. 6d.; common coal, 6s. 6d. to 8s. per ton; burgy, 5s. 6d.; and ordinary slack, 3s. to 4s. per ton.

The shipping trade shows little or no material change, and except that a moderate quantity of best coal and gas coal is being shipped, there is very little doing.

For coke there is still only a moderate inquiry, and the Manchester Corporation have found it necessary to reduce the price of their gas cokes.

There is a tolerably good inquiry for iron for delivery into next year; but, as sellers will only entertain forward orders at an advance upon present prices, there has been very little doing, beyond a few transactions for immediate delivery at late rates. Quotations are about the same as those last given, and range, for delivery into the Manchester district, about 56s. to 57s. per ton for No. 3 Lancashire foundry pig iron, and 55s. per ton for No. 4 forge. Finished iron has a tendency to be a little stiffer, and local makers are endeavouring to get about £7 per ton for bars delivered into the Manchester district, but the average prices remain about £6 12s. 6d. per ton.

Belgian firms continue to compete very keenly in this district, and one of their houses supplied the iron castings required in the construction of the new Manchester Conservative Club House.

An extraordinary general meeting of the shareholders in the Ebbw Vale Steel, Iron, and Coal Company was held at Manchester on Friday, for the purpose of passing the following resolution—"That the following article be inserted after Article 43 of the Articles of Association of the company: "Reduction and Division of Capital (43*a*).—'The company may from time to time reduce the amount of its capital, or consolidate or subdivide the same into shares of a larger or smaller denomination.'" The resolution was moved by Mr. Edward Coward, the chairman, seconded by Mr. W. Sumner, the deputy-chairman, and agreed to unanimously; and during the course of a conversation that followed, a much more hopeful view was taken of the prospects of the company.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The weather was very unsettled on the north-eastern coast last week. November is likely to be a stormy month right through. It is a considerable time since there has been so much detention of coasting steamers with gales of wind, as there has been during the past three weeks. There were no sailings of screw colliers between Sunday and Tuesday. It was only on Wednesday a large fleet of steamers got to sea, and when they did get out they had to en-

counter dense fogs, which impeded their progress south very seriously. There has been a good supply of gas coals at the shipping-places, and loading terms have been short at the docks. Local orders for the bye-ports have been in the market, and ready ships have been engaged to load gas and household coals as they have arrived, at an advance of from 6d. to 9d. per ton upon previous quotations. The price of gas coals is without much material change. The collieries are working very well. But more tonnage could be used if it came to hand regularly. Most of the small coasters lying in the Tyne are loaded. A large fleet of ships sailed from the Tyne to the south on Friday. There is still a very good demand for gas coals for the Mediterranean. The steam collieries are working badly. Several second-class steam collieries are about to be laid in for want of work. The price of second-class steam coals is getting lower. Small coals of most kinds are selling at very low prices.

The iron trade of the North of England seems to have got over the worst. It looks as if it was about to recruit again. The uncertainty which surrounds the Eastern Question, however, has a bad effect upon continental trade. The shipments of manufactured goods thence are limited.

The chemical trade has been in an excited state this week. But a good deal of the business transacted has been of a very speculative character.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

At a meeting of the shareholders of the Inverkeithing Gas Company, held last Monday evening, it was resolved that the price of gas to consumers should be reduced 10d. per 1000 cubic feet—from 9s. 2d. to 8s. 4d.—and at the same time it was agreed that the usual dividend of 5 per cent. should be declared, to be payable to the shareholders on and after the 1st of December.

Provost Shanks and the magistrates of Johnstone, as representing the Police Commissioners of that town, lately waited upon the directors of the gas company for the purpose of urging the propriety of a reduction of the tariff charged to the burgh for lighting the street-lamps. The directors were firm in considering it inexpedient to modify the charge, believing that the tariff was not exorbitant in comparison with the other districts which were named.

The Town Council of Rothsay, at their usual monthly meeting held last week, unanimously resolved to reduce the price of gas 5d. per 1000 cubic feet, and to double the capacity of their largest gasholder, by telescoping it, at an expense of £370.

At a meeting of the Town Council of Kilmarnock, held last Wednesday, it was agreed, on the recommendation of the Gas Committee, to purchase certain property in Park Street, for the extension of the coal storeage space of the works.

Complaints are again being made in Dundee regarding the quality of the gas which is now being supplied to the consumers. One complainer says that in many shops the lighting seems to be no better than if it were done by common "dips."

From Renton, in the Vale of Leven, Dumbartonshire, there are complaints of a very different sort. Although it is a manufacturing town of some 3000 inhabitants, there is not a single public lamp in the streets, all of which are in a state of dense darkness after sunset. The adjoining towns of Bonhill and Alexandria are almost benighted.

On Friday last the 6¾ per cent. Glasgow Corporation Gas Annuities were sold at an advance of £1 15s., at 163, while an odd lot of 9 per cent. annuities were transferred at 217½, being an advance of £2 10s. on the previous price.

In respect of its illuminating power, the Glasgow gas for the week ending Nov. 11 had an average range from 25·97 candles to 27·88 candles. The highest maximum was 28·84 candles, at Tradeston station, and the lowest minimum was 25·03 candles, at Dawsholm.

The town of Forfar is acquiring a most unenviable reputation in regard to the question of water supply. At the recent municipal election, the candidates who were in favour of bringing in an abundant supply of water were turned to the "right about," and since the election the Police Commission, as reconstituted, have resolved to throw Mr. Bateman's scheme overboard. The Board of Supervision have now stepped in, and insist on something being done in the way of taking the preliminary steps required by statute for application to Parliament. There is great excitement in the town, as it is feared that the Board of Supervision will raise an action in the Court of Session against the Police Commissioners. Some of the townspeople have resolved to support the board in their action towards the contumacious burgh authorities.

Perth is in a somewhat similar difficulty. There was a desire to have a bill promoted in Parliament, during the ensuing session, in accordance with Mr. Bateman's report, but in the meantime the scheme has fallen through.

A considerable business has been done in pig iron during the past week at constantly advancing prices. The closing prices on Friday were 58s. 7½d. to 58s. 9d. cash, for sellers. Several makers have advanced their prices 6d. to 1s. per ton.

The coal trade is tolerably active, but many of the collieries are kept idle two or three days per week for want of railway waggons. Prices are keeping firm.

CHRISTCHURCH GAS COMPANY.—This company has just been registered. It is formed "for supplying the inhabitants of Christchurch and the neighbourhood with gas and gas products, and for acquiring existing works." The company has been registered with a capital of £50,000, in £10 shares.

HEXHAM GAS COMPANY.—A paragraph from a local paper, referring to the recent improvements at the works of this company, was sent to us by a correspondent, and inserted in the JOURNAL of the 7th inst. We are asked to say that, in so far as the paragraph attributed the initiation of these improvements to the late manager, Mr. Hall, it is incorrect, the credit being wholly due to his successor, Mr. Rogers.

INTRODUCTION OF GAS INTO GLASGOW.—*Blackwood's Magazine* for May, 1817, contains the following item of intelligence:—"*Gaslight Company.*—Arrangements have been made for the establishment of a gaslight company in this city, and we have to congratulate our fellow-citizens on the near prospect of a great improvement being made in the lighting of the streets. Political economists are not, however, agreed whether or not the advantages arising from the general use of gaslights are sufficient to counterbalance the evil that will arise from the corresponding diminution of maritime employment in the whale fishery."

BIRMINGHAM CORPORATION GAS UNDERTAKING AND THE SUPPLY OF GAS TO THE OUT-TOWNSHIPS.—At the meeting of the Birmingham Town Council, on the 14th inst., the following report of the Gas Committee was presented and agreed to:—With reference to the proposal of the Local Authorities of Handsworth and Aston to purchase from the Corporation such portions of the gas undertaking as are in the Handsworth and Aston districts respectively, your committee report that, after a lengthened correspondence and several conferences with the representatives of the Handsworth and Aston Local Boards, the terms of the agreements of sale and purchase have been arranged and approved by your committee, and the agreements embodying the same are now submitted for the approval of the council. The terms are as follows:—1. After receiving six months notice in writing from either of the local boards of their desire to purchase the portion of the undertaking within their district, the corporation are to sell such portion to them. 2. The price is to be ascertained by capitalizing, at 25 years purchase, the annuities agreed to be paid by the corporation for the Staffordshire Company's undertaking, and deducting therefrom the value of the works and manufacturing plant, as appearing by the books of the company on June 30, 1875. The value is to be settled by Alderman Chamberlain, M.P., and Mr. William Aston in the case of Handsworth, and Alderman Chamberlain, M.P., and Mr. A. J. Allbutt in the case of Aston; or, if they are unable to agree, by some umpire to be chosen by them. A further deduction is to be made for the mains, pipes, and other apparatus within the districts, which are to be retained by the corporation, the value of which is to be ascertained by the before-mentioned gentlemen. The referees are further to determine the rateable proportion of the sum remaining, calculated on the basis of the ratio of the gas, supplied within the districts of the boards during the year ending June 30, 1875, as compared with the whole of the gas supplied by the company during that year. The sum to be paid by each board will be an increase on, or a diminution of, such rateable proportion, according to the increase or diminution which has taken place in the consumption of gas in the district of the board in the year ending June 30 or Dec. 31 immediately preceding the day of purchase, as compared with the year ending June 30, 1875. If either of the local boards shall make any application to the Local Government Board, or to Parliament, under the 41st or 42nd sections of the Birmingham (Corporation) Gas Act, 1875, the corporation will not oppose such application, but at the request and cost of the local board will render such assistance to them as may be necessary. If any difference arises as to the purchase money, or the mode of ascertaining the same, or the proper construction of the agreement, the matter in dispute, save as provided for by the agreement, is to be referred to arbitration under the provisions of the Public Health Act, 1875; each party to pay their own costs. Your committee recommend that the agreements be approved, and that the town-clerk be authorized to affix the corporate seal thereto."

A DISINFECTING LAMP.—Mr. T. W. Keates, consulting chemist to the Metropolitan Board of Works, contributed an article to the *Lancet* last week on a mode of generating sulphurous acid for use as a disinfectant, in which, after referring to the cumbrous and uncertain methods formerly employed—viz., by burning sulphur or by its solution in water—he proceeds to speak of the present method of obtaining it by burning bisulphide of carbon in a common spirit-lamp. He states that "by a modification of the method of burning, the amount of sulphurous acid produced in a given time can be regulated to any desired extent. It is a property of the bisulphide of carbon to dissolve in fat oils and hydrocarbon liquids, such as petroleum; so by mixing it with any one of these liquids, and burning the mixture in a properly constructed oil or petroleum lamp, sulphurous acid will be generated with the other usual products of the combustion of such materials, and in proportion to the quantity of bisulphide present in the mixture of combustible liquids; any proportionate quantity of sulphurous acid can in this way be thrown into an atmosphere, and the action may be continued for any length of time. As the sulphurous gas is generated *pari passu* during the combustion of the bisulphide, it diffuses itself in the air, which in a short time will become completely impregnated with it. In a room containing about 1300 cubic feet of air it was found that by burning 280 grains of the bisulphide the atmosphere was so far charged with sulphurous acid that it was impossible to remain in the room for more than a few seconds. In five minutes after the lamp was lighted, litmus paper began to be reddened at some distance from it; in ten minutes the air had become very oppressive, and the litmus paper was reddened in the extreme corners of the room; in 15 minutes the air was so charged with the gas that it could scarcely be breathed, and in 20 minutes it was unbearable. In that time, as I have said, 280 grains of bisulphide were consumed in a simple single-wick lamp. Sulphurous acid generated in this manner can be applied with facility to the disinfection of any place or object. In the case of rooms in which infectious or contagious disease has prevailed, it is only necessary to light the lamp and allow it to burn until the atmosphere has become impregnated with the gas to any desired extent, and then to remove or extinguish it just like a common spirit-lamp. In the simple form of apparatus which is suggested for this purpose, the lamp is enclosed in a metal case, about 3 inches in diameter, and 8 or 9 inches high, furnished with holes near the bottom for the admission of air, and others in the top for the emission of the sulphurous gas. This can be conveniently moved about, and placed, while the lamp is burning, in almost any locality. Receptacles for infected clothing, or the clothes or linen used in connexion with disease, or carriages which have conveyed fever or other patients, can be thoroughly purified without difficulty, and with very little trouble. For the disinfection of ships, too, the lamp is particularly suitable, as it can be carried into the remotest part of the ship and burned without the least danger, and with the certainty of effecting its object completely. It must be observed that the bisulphide of carbon is extremely volatile, having its boiling point as low as 110° Fahr.; it is, therefore, necessary that the lamp in which it is burned should be furnished with a well-fitting screw-cap, to prevent the liquid from evaporating, and at the same time to keep its peculiar odour from escaping. This odour is often very nauseous, but the bisulphide is now manufactured by Messrs. C. Price and Co., of Thames Street, so pure, that it possesses very little smell, and can be used without the least inconvenience.

Register of New Patents.

4427.—SUGG, W. T., Vincent Works, Westminster, "*Improvements in apparatus for maintaining the proper water-level in station gas-meters.*" A communication. Patent dated Dec. 21, 1875.

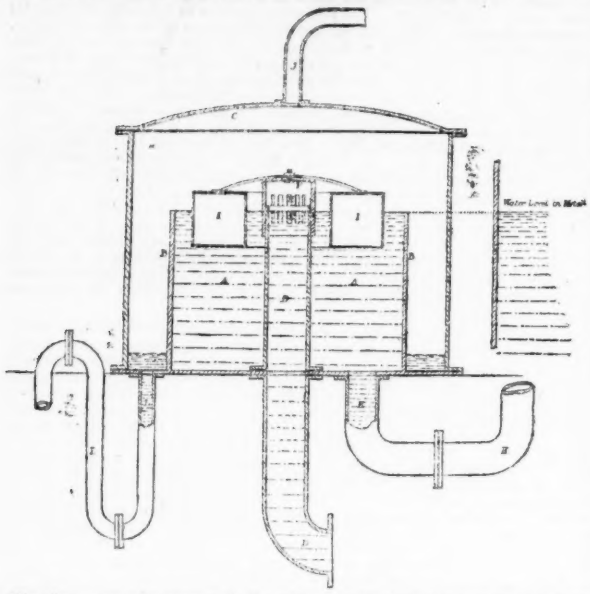
This apparatus consists of a water-supply cistern placed at a convenient height above the tank in which the measuring drum or wheel revolves. This cistern communicates by means of a pipe (which varies in size according to the size of the meter to which the apparatus is applied) with a cylindrical tank covered with a top having a gas-tight joint. The pipe rises in the centre of this tank to a height a little above the level of the water in it, and this level must be on the same plane as the true water-level within the measuring drum of the station-meter to which the apparatus is attached. A little below the top edge of the pipe are perforations for the delivery of the water into the tank, and the top is furnished with a cap, having a number of perforations corresponding in size and position to those on the top of the supply-pipe. The cap is made by preference of gun metal, and is turned true, as is also the top of the pipe, so that the cap may slide over the pipe with sufficient accuracy to form a valve, which opens as it descends, and closes as it rises, the delivery openings in the supply-pipe. Attached to this cap is an annular float which is partially immersed in the water contained in the tank. The depression of the water is followed by a corresponding movement of the float, and the cap thus opens the delivery holes in the supply-pipe. As the water attains its normal level the float and cap rise and shut off the further admission of water.

At the bottom of the tank is a large pipe (varying in area according to the size of the station-meter to which the apparatus is applied), which communicates with the interior at or near the bottom of the case or tank in which the measuring drum revolves.

Within the tank containing the float and cap a circular partition, concentric with the water-supply pipe, is carried up even with the true water-level both in the tank and in the interior of the measuring drum of the station-meter. Any water which passes this level falls over the edge of the partition into the annular space between it and the external wall of the tank, and is conveyed away by a waste-water pipe. At any convenient point above the water-level is connected a pipe, varying in size according to the size of the meter to which the apparatus is attached, from one inch to three inches in diameter. This pipe is carried up some three or four inches above the true water-level in the interior of the inlet hollow cover. The pressure of the gas is thus conveyed from the interior of the measuring drum to the tank containing the float and cap.

The result of these arrangements is that when the water-line in the interior of the measuring drum is depressed from any cause, that also in the annular tank

will be lowered, whereupon the float and cap will descend and admit water into the tank till the proper level is restored, by which time the float and cap will have risen to such a height as to prevent the further inflow of water.



The above engraving represents the apparatus principally in section; A being the tank with its circular partition, B, and cover, C; D is the water-supply pipe with holes, E, near its top edge; and F is the cap with its holes, H; I is the annular float attached to the cap, F; and J is the pipe which communicates with the upper part of the inside of the hollow cover of the measuring drum; K is the pipe which leads from the bottom of the tank to the station-meter tank, and is a waste-water pipe.

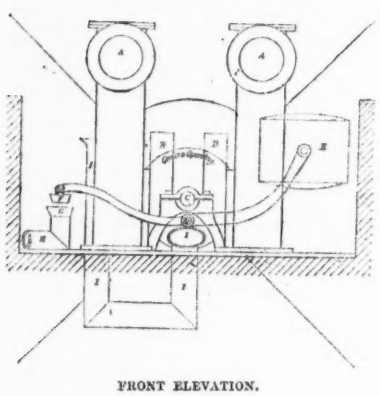
4428.—Sugg, W. T., Vincent Works, Westminster, "*Improvements in station and test gas-meters.*" Patent dated Dec. 21, 1875.

This invention has for its object the maintenance of the water-level in station gas-meters at its proper height. This is effected by making the measuring wheel or drum so as to revolve upon its axis within a tank partially filled with water, the axis or shaft of the drum being supported by suitable bearings within the tank. The drum or wheel is provided with a hollow cover both to its front and back, each cover having a centre opening. The inlet-pipe or pipes pass through the centre opening into the front hollow cover, and the outlet-pipe or pipes through the centre opening into the back hollow cover. Water is conveyed from a supply cistern fixed at a convenient height above the water-line of the meter to the tank through a large pipe (varying in size according to the capacity of the station-meter to which the apparatus is applied) which enters it outside the wheel or measuring drum. The top of this pipe is provided with a valve-seat of any convenient form, and the valve which fits into this seat is hung to an arm fixed to the end of a spindle which is outside the inlet hollow cover of the measuring drum. The other end passes inside the inlet hollow cover, and to it is fixed another arm having at its extremity a float swimming in the water inside. The length of this arm should be such as to give with a very slight up-and-down motion of the float sufficient movement to the valve outside to open and close it. The spindle supporting these arms works in suitable bearings furnished for the purpose.

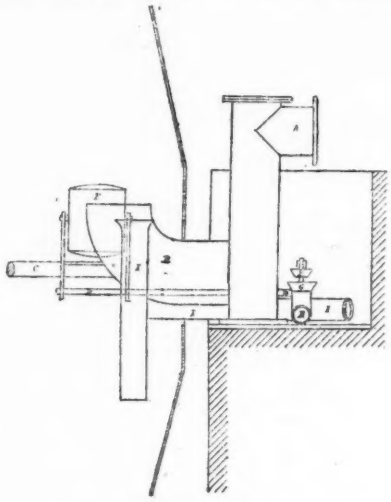
If, from any cause, more water is supplied to the tank than is required to keep the float at the true water-level, it overflows into a pipe provided for the purpose, which is also fixed in the inlet hollow cover, and the top of which is funnelled out. The true level of the water at which accurate measurement of gas is obtained is determined by the height of the top edge of the funnel.

It will be seen from the foregoing and from the drawings that, in station and test-meters constructed in this manner, the upper part of the outer casing may be dispensed with, and that upon any depression occurring in the level of the water in the inlet hollow cover of the measuring drum, the float will sink and cause the valve in connexion with the water-supply pipe to open, whereupon water will be admitted until it rises to the proper level when through the action of the float the valve will be closed and the further supply of water cut off.

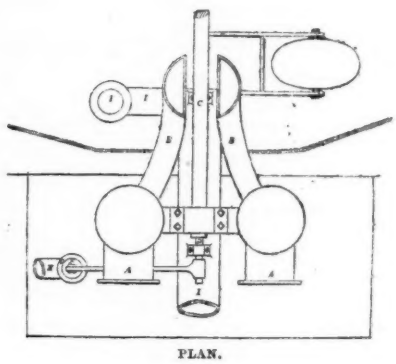
The inventor states that by the adoption of this apparatus greater accuracy of measurement under varying rates of speed and pressure may be obtained than in station and test gas-meters as now ordinarily made, and that the making of station gas-meters without a casing over their upper part is not new, neither is the application of a cover at the front and back of the drum.



FRONT ELEVATION.



SIDE ELEVATION.



PLAN.

In the above drawings, A A are the gas inlet-pipes; and B B the spouts; C is the shaft of the measuring drum; and D the rocking-shaft, to one end of which the float, E, is attached and to the other the valve, F, is hung; G is the valve-and H the water-supply pipe; I is the waste-water pipe.

When this invention is applied to test meters, it is preferred that the drum shall be encased, and provided with a water reservoir, which is fixed to the top of such case.

4477.—Walker, W. T., Highgate, "*Improvements in gas scrubbers and in apparatus connected therewith.*" Patent dated Dec. 23, 1875.

This invention relates to that description of scrubbers or apparatus for purifying coal gas from ammonia and other impurities patented by the present inventor on the 3rd of October, 1871 (No. 2606), and has for its object rendering such apparatus more efficient, simplifying its construction, and providing increased facilities for operating and regulating the various parts of the mechanism.

One part of the present invention has reference to means to be employed for ensuring the delivery of the water from the service-tank to the scrubber in a constant quantity, and at a uniform pressure, according as the varying depth of the water in the service-tank may render necessary, and also for indicating the effect produced by the water as it passes through each of the tiers or columns of coke inside the scrubber.

For this purpose a tube is employed leading from the water-service tank at the top of the scrubber inside or outside of the same, to a convenient distance from the bottom of the scrubber outside, where it is fitted with a regulating valve which is thus brought within the reach of the attendant. The tube is thence conducted to a receiver situated at the top of the scrubber below the water-service tank, and consisting by preference of a central vessel in which the water is maintained at a uniform level by means of a float, and of outer vessels connected with the central vessel by branch passages, whence the water is constantly delivered at an approximately uniform pressure into receptacles which conduct it into the scrubber. A gas-testing cock of the description patented by the present inventor is placed in the inlet, and a similar one in the outlet, to ascertain the temperature of the gas on entering and leaving the apparatus. In connexion with each of the tiers or columns of coke, with the exception of the lowest tier or column (as has previously been practised), a trough is placed for collecting samples of liquor for testing, but in lieu of withdrawing the liquor direct from the troughs, a screen is applied to stop pieces of coke or dirt from passing, and tubes are fixed leading one from each trough, inside or outside the scrubbers, downwards to near the bottom of the apparatus, within reach of the attendant, at which point outside they are fitted with stopcocks. These cocks, with the regulating valve before mentioned it is preferred to arrange in close proximity to each other, so as to afford facility for the attendant obtaining samples of the liquor from each tier or column, and testing the same, and regulating the water supply according as the result of the testing of the liquor may indicate to be necessary.

The regulating valve consists of a slide which is enclosed in a casing and works over an aperture by preference of a rectangular shape, or over a series of circular apertures, to which slide there is attached an external indicating slide, having a pointer arranged in connexion with a graduated scale in such a manner that the valve-slide and indicating-slide work in unison, and that the indicating slide denotes the quantity of water passing in accordance with the adjusted position of the valve.

It is proposed to enclose the regulating valve with the testing cocks from each tier or column of coke in a suitable box, in which may also be contained tubes with stopcocks leading from the inlet and the outlet respectively of the scrubber for the facility of testing the gas as it enters and leaves the apparatus.

Another part of this invention relates to the apparatus for collecting the water from the receivers before mentioned, and distributing it to the scrubber by a regular continuous motion, avoiding jerks, catches, and other interruptions in the motion, and it consists of a series of crank discs corresponding in number to the outer receiving vessels above, and operated from a central eccentrically recessed disc through the intervention of levers or connecting rods with suitable guides if necessary. The crank discs are formed of a cup of annular trough shape for the reception of the water discharged from the receiver above, and which thence passing through the tubular revolving arms (on the axes of which they are fitted) is distributed continuously over the revolving frame situate at the top of the scrubber at a variable speed, so as to diffuse the water uniformly over the entire surface. Motion may be imparted from a central shaft driven from the main shaft (by means of bevel or frictional gearing or otherwise), either direct to the central eccentrically recessed disc, or through the intervention of suitable spur or frictional gearing, in order to increase the speed of the water-spreading arms. In lieu of using crank discs, the required variable speed may be obtained by the employment of cams or eccentrics, operated by frictional contact or otherwise than by toothed gearing.

Another part of the invention relates to an improved means of lifting the hollow central spindle of the water-spreaders when required, in order to admit of the oil, which is supplied through its interior, passing beneath its bottom face, and consists in the employment of a cam collar fast on the spindle, forming an inclined plane, which is caused to pass over a suitable roller or projection, whereby the spindle is alternately lifted and allowed to fall as it revolves, so as to give free passage to the oil between the bearing surfaces.

The invention also relates to means for driving the apparatus, and consists in

attaching the steam or other motive-power engine employed to the side of the scrubber by preference at the lower part thereof, and in obtaining the required reduction of speed by means of an endless screw or worm and a worm wheel, whereby the foundations for the engine and the shafting and gearing ordinarily required are dispensed with, and considerable economy is effected in the cost of erecting the apparatus.

4490.—JENSEN, P., Chancery Lane, London, "*Improvements in the construction of fluid-meters.*" A communication. Provisional protection only obtained. Dated Dec. 24, 1875.

The fluid-meter constructed according to this invention consists of a circular flat box, a cover, an inner revolving-drum with three hinged flap-valves, and a closing piece more or less sector-shaped and forming an inner projecting part of the box. The aperture for the inflowing water or other fluid is at one side, and the drum revolves in the same direction as the inflowing water. The exit aperture is on the same side as the inlet opening, but below it. The inside bottom of the box has a central steel disc formed with teeth for a small part of its circumference, and from the farthest point of this toothed part the circumference is continued for rather more than a quarter of the circle, with a radius equal to the outside radius of the teeth; the remaining part being struck with the radius of the bottom of the teeth. The three valves have each a toothed sector of 90°, the pitch line of which is equal in length to the toothed part of the steel disc, so that when gearing with it each flap-valve makes exactly a quarter of a turn. Supposing the first flap is against the side of the box where it comes in contact with the closing piece, whereby it is bent in towards the middle, the next flap in advance then gets into gear with the toothed part of the steel disc, whereby this flap is turned a quarter of a revolution, its extreme outer point touching the inner circumference of the box; the flap in advance of the last-named flap next in its travel comes in contact with the closing piece, which bends it from its unfolded to its folded position, and so on.

13.—RAWSON, C., Victoria Chambers, Westminster, and SLATER, J. W., Tamworth Terrace, London, "*Improvements in deodorizing and purifying sewage.*" Patent dated Jan. 1, 1876.

This invention relates to the deodorization and purification of sewage by precipitation, and consists in treating it with any or all of certain mixtures of basic sulphate of alumina, either alone or occurring in combination or admixture with the sulphates or basic sulphates of iron, clay, charcoal, and manganated lime.

39.—MARRIOTT, W., Huddersfield "*An improved method of purifying coal gas.*" Patent dated Jan. 4, 1876.

This invention was described and illustrated in the JOURNAL for Sept. 12, p. 381.

38.—THACKER, S., Nottingham, "*Improvements in gas-engines.*" Provisional protection only obtained. Dated Jan. 7, 1876.

This invention relates to improvements in the Lenoir gas-engine. There the admission of air is regulatad by a dome capable of revolving to the right or left, thus opening or closing the apertures by which the air is admitted; but by this arrangement it is not possible to regulate properly the air on both sides of the piston.

This invention consists—

Firstly, of a pair of slides working in V grooves or other suitable guides on the top of the air vessel, and adjusted by screws passing through a fixed nut, by means of which the quantity of air admitted at either end of the cylinder is varied at will.

Secondly, of an improved discharger or exploder. In Lenoir's exploder there is but one point of discharge for the electric current, which renders the explosion uncertain; but this improvement consists of making two or more points of discharge, so that if the electric current should fail at one place it is certain to have effect at another, which is a great advantage to the steady working of the engine.

Thirdly, of an improved method of jacketing the cylinder so as to obtain a larger and more complete circulation of water round the same, especially in the immediate vicinity of the ingress and egress ports.

Fourthly, in an improved method of making the joint at each end of the cylinder where the cover is joined to the cylinder. In the Lenoir cylinder the openings of the water spaces, or jackets, at the ends of the cylinder render the making of the joints very complicated and almost impracticable, whereas this invention consists of diverting, by coring, the water circulation, filling up the spaces at the ends of the cylinder, and making the connexion between the cylinder and cylinder covers at the top and bottom sides of the cylinder, or in any other part of the external surface which may be found most convenient.

Fifthly, in an improvement in the insulation of the ebonite disc. For this purpose the discharging disc is made of one complete block or slab of ebonite, or other non-conducing material, instead of in segments as before, so as to ensure more perfect insulation.

104.—URQUHART, J., Manchester, and ANDREWS, W. W., Kingsland Road, London, "*Improvements in wet gas-meters.*" Patent dated Jan. 8, 1876.

The objects of this invention are—1. To secure the more correct measurement of gas by causing the water or other liquid, both within and without the measuring chamber, to assume, as nearly as possible, the same level under varying or excessive pressures and speeds. 2. The more efficient arrangement of the float to be applied for cutting off the supply of gas when the liquid is depressed below a certain level. 3. The prevention of gas from entering the index-box, thus reducing the liability of an escape of gas. 4. In an improved overflow or waste-water box. 5. In an improved mode of supporting the drum-shaft.

The first part consists in dispensing with the partition which ordinarily divides the front or float chamber from the drum chamber, so that the gas is free to envelop the whole exterior of the drum above the water-level. In lieu of the partition, a strip or bar, or strips or bars, of metal, are substituted, so as to maintain the parts dependent thereon in proper position. The hollow cover, which is usually placed in front of the drum, is, in this invention, fixed to the back, and a bent tube, to carry off the gas to the outlet, is inserted within the cover, the upper end of it being made to stand as high as the cover, when revolving, will permit. One end of this tube is, as before stated, within the cover, the other end is inserted into a tube or conduit which conveys the gas to the outlet of the meter. Into the outlet tube or conduit is fixed a pipe, which leads to the waste-water box in the front of the meter, and will carry off any condensation that may be deposited therein.

The second part consists in making the inlet-tube of a bent shape, the bottom edge forming the seat for a valve fixed to a rod, the opposite end of which terminates in a float. The rod being pivoted at some distance from its extremity, the valve will rise or fall in accordance with the position of the float and level of the liquid, which on being depressed below a certain limit will cause the valve to close and shut the gas entirely off.

The third part refers to means for preventing gas from entering the index-box, and consists in the application of a stuffing-box of a peculiar form to the upright spindle that communicates motion from the drum-shaft to the index. The stuffing-box, or hydraulic seal, is partially filled with oil or with tallow, or a combination of both.

The fourth part refers to an improved arrangement whereby the overflow or waste-water box is placed concentrically, or nearly concentrically, with the outer case of the meter.

And the fifth part refers to the mode of supporting the back part of the drum-shaft, by fixing the bearing at the front of the outlet-pipe.

In the accompany drawings, fig. 1 represents a meter with the front of the case and part of the index-box removed. Fig. 2 is a vertical section of the case and drum of the same meter, in which the cover is placed at the back of the drum. Fig. 3 is an elevation of the stuffing-box or hydraulic seal; and fig. 4 is a vertical section of the same. A represents the case; B, the inlet-pipe; C, the valve fixed to an arm pivoted at D, and provided with a float, E; F is the drum; G, the cover; and H, the bent pipe which leads the gas from the cover to the outlet-tube, I, and from thence to the outlet, J. Any condensation that may take place in the bent pipe or outlet-tube will fall down the lower part of the pipe or conduit, I, and be carried away by the pipe or conduit, K, to the waste-water box, L, placed in the front and side of the meter; M is a small pipe or conduit communicating with the waste-water box, L, and is furnished with a run-off plug at N; O is the overflow-pipe leading to the waste-water box also; P is the worm-wheel spindle or upright shaft which passes through the case, and is provided with a stuffing-box or hydraulic seal, Q, shown more distinctly in figs. 3 and 4, drawn to a larger scale. In fig. 1 the filling-tube is marked T.

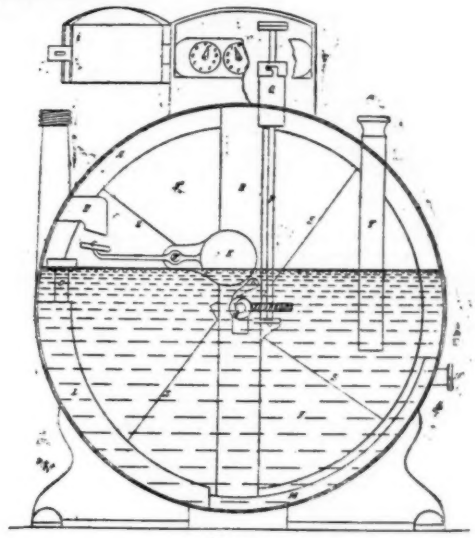


FIG. 1.

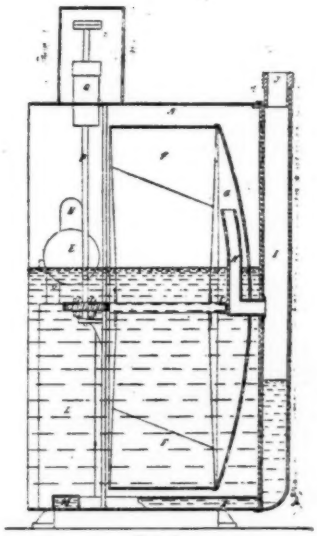


FIG. 2.

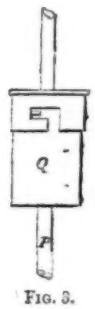


FIG. 3.

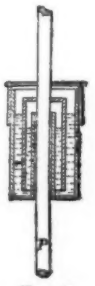


FIG. 4.

It will be observed that in this meter the diaphragm or partition ordinarily placed between the front chamber and that in which the drum revolves is dispensed with, and a bar of metal, R, only is substituted to support the drum-shaft, worm-wheel, and float. The gas enters by the inlet-pipe, B, passes into the body of the meter and into the drum by the slits or openings, S, S, into the divisional chambers of the drum, and from thence into the cover, G. From here it is led off by the bent pipe, H, to the outlet, J. The result of the construction of meters in this manner is that the whole of the liquid used therein is subjected to the same pressure, or nearly so, and as a consequence the registration will be the same, or very nearly the same, when working under excessive pressures or speeds as when only the ordinary pressure is employed for or speed attained in actuating the meter.

It will be seen that the ordinary seal-tube usually surrounding the upright shaft, P, is dispensed with, and that the stuffing-box or hydraulic seal, Q, fixed on the outside case and within the index-box is substituted.

Although it is preferred that the drum-shaft shall be supported by fixing the bearing in front of the bent pipe, as shown at U, fig. 2, the bearing or support may be fixed to the back of the meter-case, as now commonly done, and the bent pipe inserted through the centre, opening either above or on one side of the drum-shaft or bearing.

114.—SPACKMAN, I. A., Holloway, "*Improvements in lamps or lanterns.*" Provisional protection only obtained. Dated Jan. 11, 1876.

These improvements consist of a reflector or radiator, having a hole in its centre, and placed in the inside of the lantern, in a horizontal position at a suitable height above the burner. Beneath the reflector is placed a glass, of hemispherical, conical, bell, funnel, or any other suitable form. In the top of this glass is a hole, from which a chimney is carried, passing through the reflector or radiator and the top of the lantern.

APPLICATIONS FOR LETTERS PATENT.

4221.—Lake, W. R., Southampton Buildings, London, "An improved pressure indicator for taking continuous diagrams." A communication. Nov. 1, 1876.
4283.—Gent, J. S., Salford, Lancs, "Improvements in apparatus employed in the manufacture of gas-burners." Nov. 6, 1876.
4296.—Westinghouse, G., jun., Pittsburgh, U.S.A., "Improvements in and in apparatus for lighting railway carriages." Partly a communication. Nov. 7, 1876.
4364.—Blake, J., Accrington, Lancs, "Improvements in valves for reducing and regulating the pressure of steam and water." Nov. 11, 1876.
4369.—Newton, H. E., Chancery Lane, London, "Improvements in lamps." A communication. Nov. 11, 1876.
4379.—Othon, L. P., Westminster, London, "Improvements in pumps." Nov. 11, 1876.
4380.—O'Neill, A., Baltimore, U.S.A., "Improvements in pipe-joints." Nov. 11, 1876.
4381.—O'Neill, A., Baltimore, U.S.A., "Improvements in modes of constructing and laying mains and service-pipes for water, gas, &c." Nov. 11, 1876.
4386.—Clark, A. M., Chancery Lane, London, "Improved apparatus and machinery for generating and utilizing a motive gas obtained from water." A communication. (Complete specification.) Nov. 11, 1876.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1891.—Denton, J. B., Whitehall Place, London, "Improvements in filtering or purifying water, and in the apparatus employed therein." May 5, 1876.
1913.—Smith, J., Bow, London, "Improvements in water-gauges, applicable also to gauge, steam, and other cocks." May 6, 1876.
1961.—Lascelles, C. T. E., New Cross Road, London, "Improvements in gas and other explosive motive-power engines." May 10, 1876.
1985.—Taverdon, C. L., Paris, "A self-acting pump for winding and pumping, also for measuring liquids, and for other useful purposes." May 11, 1876.
2124.—Webb, W., Twickenham, London, "An improved method of and machinery for separating the liquid and solid portions of sewage." May 19, 1876.
2147.—Mohr, F. W. B., Eastcheap, London, "Improvements in treating spent oxide of iron obtained in the preparation of gas to produce colouring matters and other products." May 20, 1876.
2155.—Melling, T., Liverpool, "Improvements in modes of and apparatus for regulating pressure in pipes or other conduits, and measuring and registering the quantity of water or other fluid flowing through them." May 20, 1876.
2350.—Johnson, J. H., Lincoln's Inn Fields, London, "Improved apparatus for generating and distilling carburetted hydrogen gas from coal or other carbonaceous materials." A communication. June 5, 1876.
2591.—Redwood, T. B., North Finchley, London, "Improvements in the manufacture of gas for burning." June 23, 1876.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3308.—Newton, H. E., "An improved mode of connecting gas, water, or other pipes." Oct. 11, 1873.
3314.—Manwell, J., "Improvements in charging horizontal retorts, and in apparatus therefor." Oct. 13, 1873.
3331.—Towle, J., "Improvements in the means employed for treating sewage." Oct. 15, 1873.

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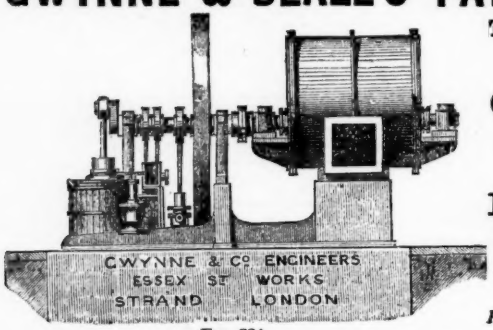

FIG. 224.

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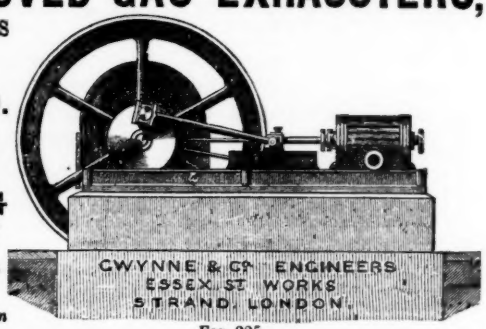

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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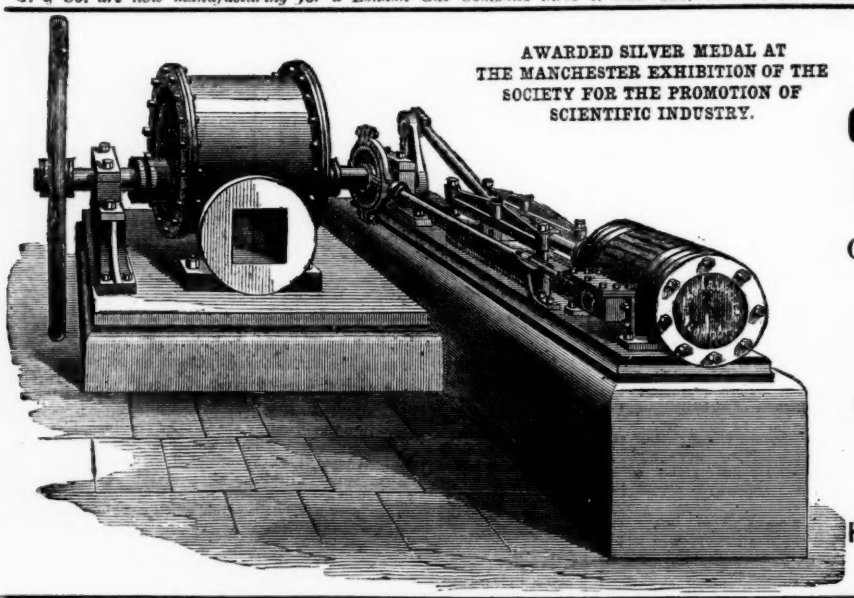

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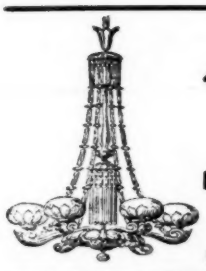

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Gas-Works, Londonderry, Nov. 13, 1876.

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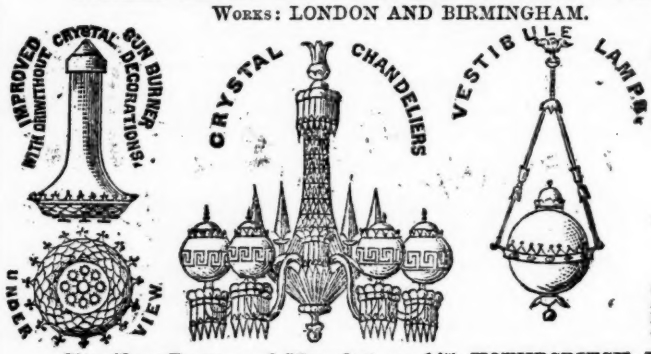

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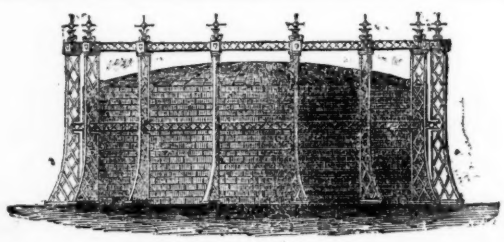

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TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

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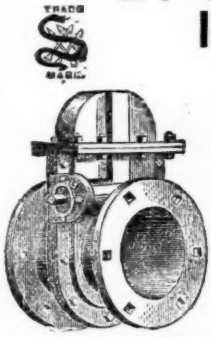
NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

B. DONKIN & CO.'S IMPROVED GAS-VALVES



WITH WROUGHT-IRON PINIONS,

List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

VALVES MADE WITH OUTSIDE RACKS TO ORDER.

ALSO, SCREW WATER-VALVES WITH GUN-METAL FACES.

ALSO SOLE MAKERS OF

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ESTIMATES FOR GAS-WORKS OF ANY SIZE.

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HENRY LYON,

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CONSULTING GAS ENGINEER,

BROOKLYN, CHEETHAM HILL ROAD,

MANCHESTER.

Mr. ALFRED LASS,

30, GRACECHURCH STREET, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.

No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.

GARSIDE'S REGISTERED TUBE-VICE takes ⅜ brass to a 2-in. Socket.

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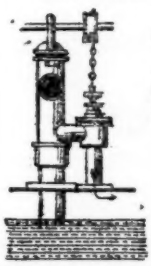
COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

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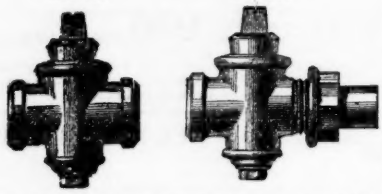
LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

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(ESTABLISHED 1851.)

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These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Waggon Works, and the Paint Trade generally. They are the BEST PROTECTORS of IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to ironwork. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only before use to be thinned down in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
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All other Colours made to order.

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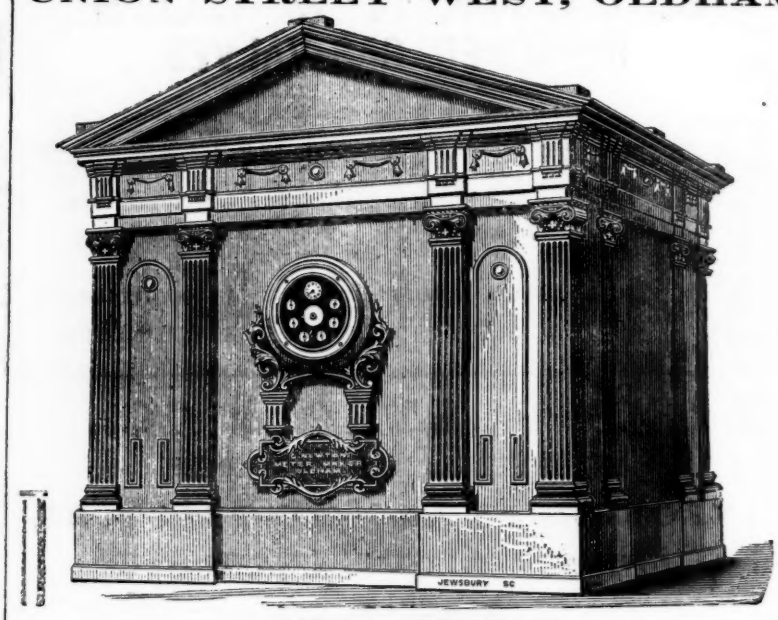

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WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

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CONTRACTING GAS ENGINEERS,
GASHOLDER & GENERAL GAS APPARATUS MAKERS,
MANUFACTURERS OF
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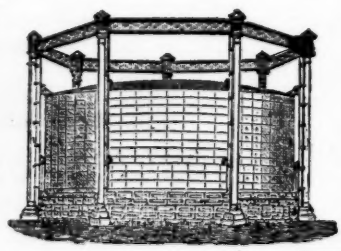
AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works**, for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs**, and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their "**Improved Condenser**," which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers**, and **Purifiers**, of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves**.

WORKS FOR THE SUPPLY OF
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S. C. AND SONS undertake the **Supply** and **Laying** of **Mains** for **Gas and Water**, and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of those goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.
Experienced Retort Setters sent to any part of the Kingdom.

Address: **PROVIDENCE IRON-WORKS, MILLWALL, LONDON.**

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(ESTABLISHED 1827,)

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CHURCH STREET,
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(NEAR THE HOUSES OF PARLIAMENT.) **LONDON, S.W.**

BUCCLEUCH ST. WORKS,
EDINBURGH.

REPAIRS OF METERS.

In the Repair of Old Meters, our aim is to do our work thoroughly, without any regard to whether they are of our own or another firm's manufacture. This principle gives a much better guarantee to Gas Companies than that which has been assumed in a circular lately issued by another firm—viz., that a manufacturer in repairing Old Meters will only do justice to those of his own make—a principle which *we*, in practice, entirely repudiate. We endeavour to maintain the reputation of our Firm in Repairs as much as in our New Meters; hence, *all* work executed by us may be equally depended upon.

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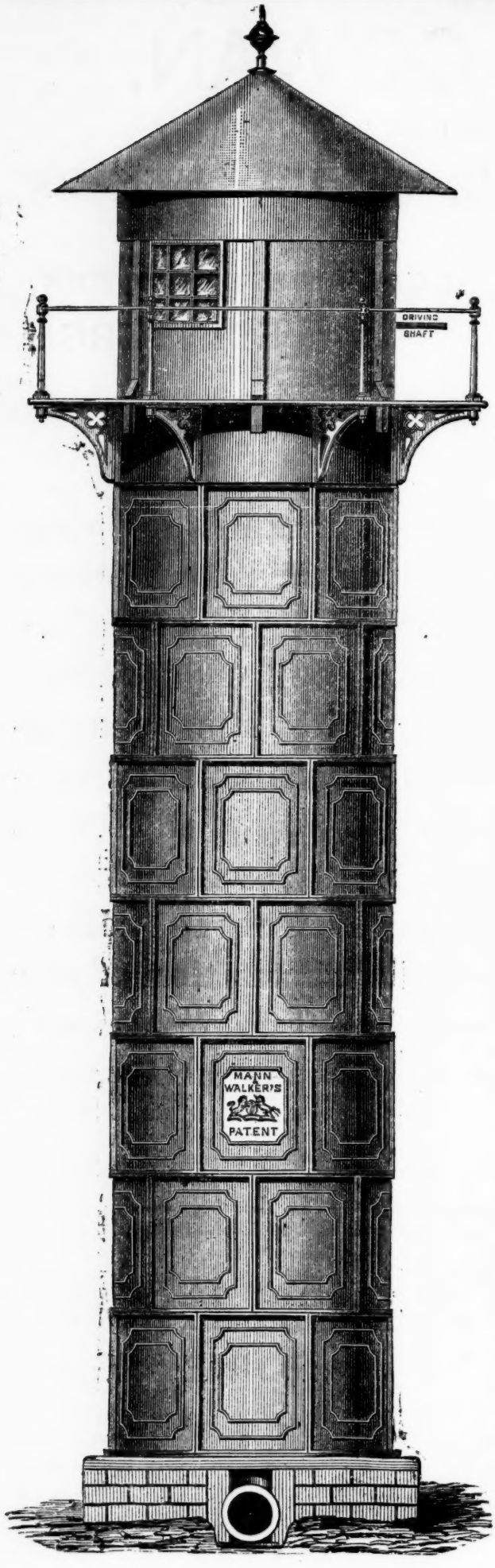
W. & B. COWAN'S large and increasing Export Trade is provided for by their keeping constantly on hand a very large stock of both Wet and Dry Meters, ready for immediate despatch to the British Colonies and Foreign Countries.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

J. EDMUNDSON & CO.,
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MANUFACTURERS OF EVERY DESCRIPTION OF
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FOR TOWNS, COUNTRY MANSIONS, &c.
Estimates given free of Charge.

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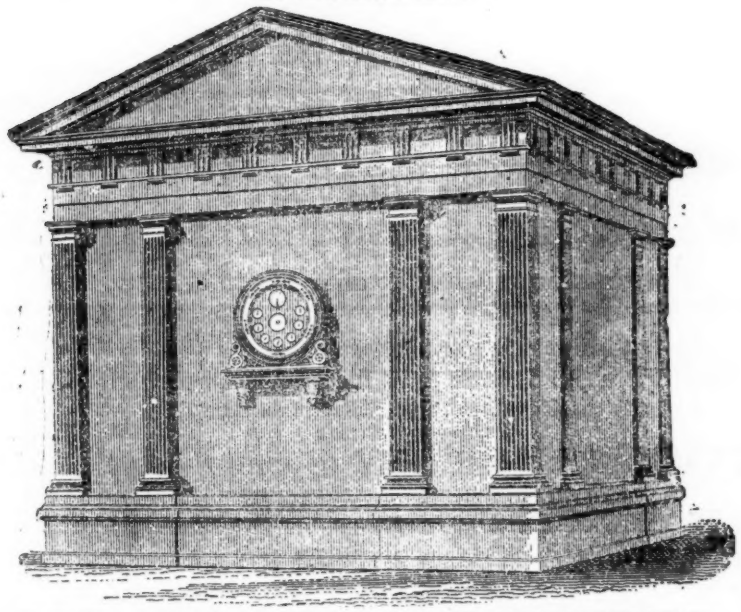
ROUND STATION-METERS,
ON CAST-IRON STANDS.



SQUARE STATION-METERS,
WITH PLANED JOINTS.
GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.
GAS COOKING APPARATUS.
Home and Foreign Orders promptly attended to.
All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.
Orders almost invariably despatched on the day of receipt.
TERMS, &c., ON APPLICATION.

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INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
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WOOD PURIFIER SIEVES,
Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.
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LAMPS.
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Is now placed throughout
CHEAPSIDE.
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STRAND.

ALBERT GAS COAL.

THE DERBYSHIRE
SILKSTONE COAL COMPANY,
LIMITED,
CAN OFFER A
GAS COAL
Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO
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ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

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BRETTELL'S ESTATE
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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
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Successors to
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GAS-RETOETS, GLASS-HOUSE FURNACE, BLAST-FURNACE, TANK BRICKS, LUMPS, TILES, And Every Description of Best Fire-Bricks.

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THE ORIGINAL MANUFACTURER OF
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.

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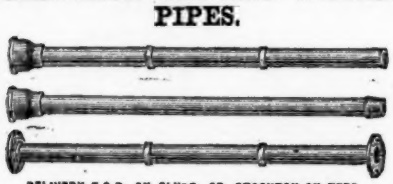
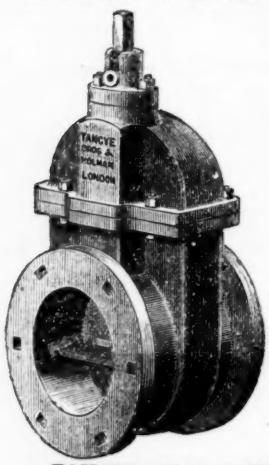
GAS AND WATER PIPES.
WILLIAM MACLEOD & CO.,
18 & 20, ALSTON STREET, GLASGOW.
CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B. ON CLYDE, OR STOCKTON-ON-TEES.
Prices on application.

IMPROVED
GAS-VALVES.

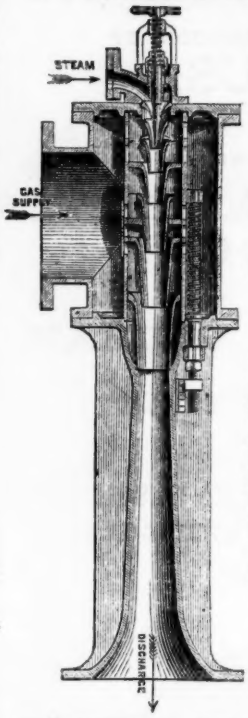


SIZES AND REDUCED PRICES ON APPLICATION.

TANGYE BROS. & HOLMAN,
LAURENCE POUNTNEY LANE,
LONDON.

KÖRTING BROS.,
Steam-Jet Engineers,
7 and 17, LANCASTER AVENUE,
MANCHESTER.

Germany: Cellerstr. 35, Hannover. Austria: Kolring., Pestalozzigasse 6, Vienna.
France: 11, Rue Louis-le-Grand, Paris. U. S.: 1645, N. 10th St., Philadelphia.



E. KÖRTING'S PATENT
STEAM-JET GAS-EXHAUSTER.
IMPROVED CLELAND'S PATENT.

Small Cost—Compactness—Perfectly Self-Acting—Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—No Extra Room Required—No Wear and Tear—No Noise—No Oscillation in Vacuum, or Back Pressure.

UPWARDS OF 200 IN USE.
SUPPLIED TO—

Chartered Gas Co.	Glasgow Corporation.	Hanna, Donald, and Wilson, London.
London Gas Co.	Leyland Gas Co.	Ratcliff Gas-Works.
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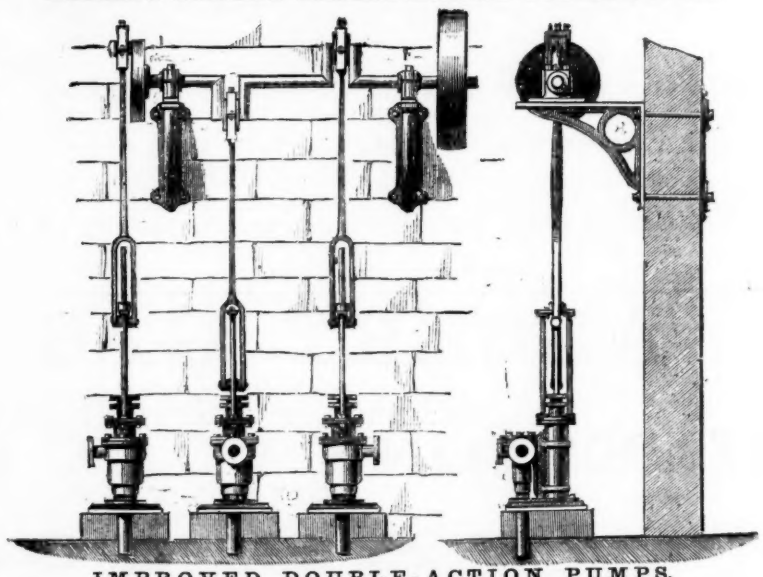

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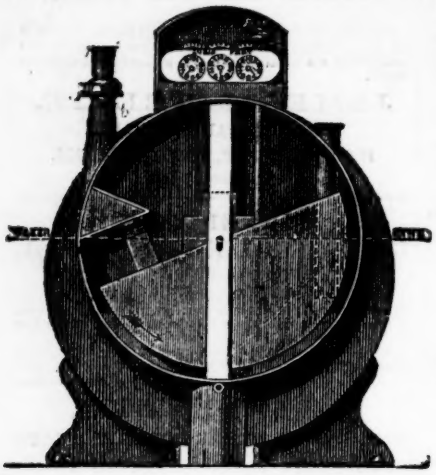

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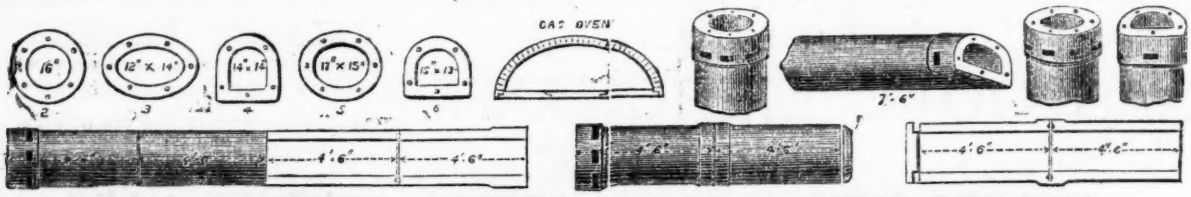

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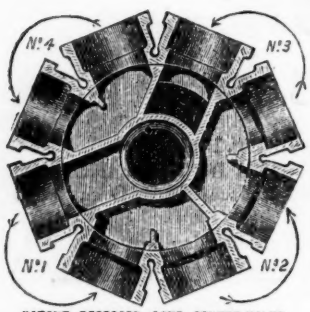

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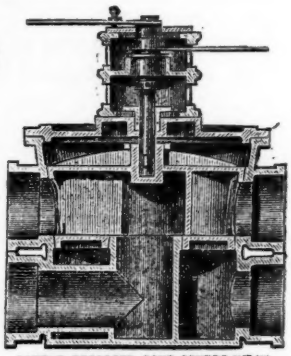

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